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PAVING SEWERAGE

MUNICIPAL ENGINEERING

WATERWORKS PARKS

A MONTHLY MAGAZINE.

DEVOTED TO THE IMPROVEMENT OF CITIES.

GOOD ROADS, STREET CONSTRUCTION,
CLEANING AND LIGHTING,
SANITATION,
BRIDGES.

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Municipal Engineering

VOLUME XIV. FEBRUARY, EIGHTEEN NINETY-EIGHT. NUMBER 2.

MUNICIPAL ART.*

By Frederick S. Lamb.

It seems strange that the American mind, usually so quick to appreciate the pecuniary value of any movement, has not seen the civic advantage of municipal art. There is a competition of cities just as there is a competition of individuals, and this competition has remained unrealized by the citizens of Greater New York. In fact, until recently, everything has been done, or left undone, to make our city as unattractive as possible. Improvements when introduced have been costly and misdirected. Millions have been lavishly expended at a late date to accomplish what could easily have been obtained at a small expenditure had the question been taken in time; millions expended, which, if expended under competent direction, would have accomplished double their present results.

Parks, which in the natural growth of the city should have been reserved, are now acquired at an enormous expenditure, and no sooner is a small section secured for the citizens than it becomes the mark of hostile legislation, and every interested corporation seeks to appropriate it for its own use.

Every new invention, every new innovation presages some new monstrosity. Every company, traction or otherwise, every inventor seems at liberty to assume a portion of the light and air left the poor public for their own benefit. Streets are rendered almost lightless, buildings tower to the skies, and the poor foot-passenger is left sunless and cheerless to wonder why the whole of Manhattan should have too much building on the one hand and too little on the other.

The so-called utilitarian spirit, the so-called progress, the so-called practical citizen have much to answer for. One of the most beautiful locations ever granted a people for a home has been ruthlessly ravaged. Every natural advantage, every natural beauty has been ignored; every opportunity sacrificed to the steady onward march of serried streets; natural drainage, natural levels, so disregarded that not only portions of the city proper, but surrounding sections, have become menaces to health. Old landmarks are obliterated; historical monuments destroyed; buildings of national importance sold for second-hand building material; rivers, fields and commons of the old villages swept away, and in their place the factory or rear tenement ap-

*Condensed from Municipal Affairs, December, 1897; New York Reform Club, 52 William St., New York.

pears. The most impressive river front ever granted a city is bereft of all natural beauty. The depredation extends to the opposite shores, and the historic section of Pleasant Valley is a fitting place for oil refineries and stock yards.

Remember Manhattan of the past, and look at it now! Where are the gifts so lavishly bestowed by nature? Central Park, a monument to the genius of its designers, Vaux and Olmstead, and Riverside Drive alone remain. City Hall Park, one of the few of the early reservations, has been encroached upon because the city officials were too parsimonious to pay a moderate sum for a suitable site for the New York post-office. City economy has been matched by corporate greed, and the beautiful St. John's Park, absorbed by the New York Central, has been forever lost to Greater New York, thus eliminating another of the few remaining breathing places.

The belief that in some unknown way New York was exempt from all rules governing other cities must have indeed been held by those in charge of the city. Not only all æsthetic questions, but even the most common laws of sanitation and everyday living have been ignored, until New York, with its filthy streets, rear tenements and corrupt government, has become the laughing-stock of foreign countries and a shining example of the failure of free institutions.

Reviewing the records of the past fifty years, it would be difficult to imagine a more disastrous management of city affairs—a management producing or permitting conditions, to correct which will take untold energy and untold wealth. Why we should have been willing to sacrifice natural advantages and recklessly, wastefully disregard the material at hand, remains and always will remain a mystery.

Nor is this waste and misapplied extravagance confined to the past. Every day we have new evidence that the same reckless spirit is at work. In the Riverside Extension, recently adopted, we learn that the city has accepted a scheme which involves an expenditure variously estimated at from three to seven millions of dollars, and yet those who have carefully looked into the question tell us that had the proposed driveway been made sixty feet wide, and "the natural grades followed more closely, the extension could have been built for one million five hundred thousand dollars, and would have been better adapted to the present street plan." The scheme adopted has been characterized as "an outrage" by the comptroller, and a leading paper, in speaking of the viaduct, states that "certainly no competent person can have been asked to consider what will be the effect of the proposed construction upon one of the most commanding and attractive points of view upon Manhattan Island, for any competent person would have answered that it would be so injurious as to be almost ruinous." The Harlem, with its many advantages, might easily have rivalled the Seine. The natural formation of the land lends itself to the picturesque construction for which the foreign river is so justly famous. The future growth of the city will necessitate the construction of many bridges in addition to those already in place, and had the officials in charge in past years been wise enough to have reserved this section, a picturesque river frontage second to none in the world could have been secured. Tardiness in

HIGH BRIDGE, HARLEM, BEFORE RECENT CHANGES WERE MADE.

BRIDGES OF THE SEINE AS SEEN FROM THE GRAND HOTEL DU LOUVRE.

action has defeated the purpose. Corporate interests have already secured river rights, and Harlem is rapidly becoming a commercial center with all its attendant drawbacks.

A spasmodic effort has been made in the speedway to redeem the short-sightedness of former generations. An enormous sum of money, some five millions of dollars, has been set aside. The project hastily conceived has been rushed through without the aid of expert advice, and so far as completed looks more like a railway cut than a driveway in the suburbs of a great city. As usual, natural formation, natural beauties have been ignored, and what might have been one of the most interesting features of our city is now commonplace in the extreme.

And during all these years what has the artist said or done? How has he met his responsibilities to the municipality?

In the early days there were but few giving their time and attention to æsthetic work, and they of necessity worked as individuals. Later the Apollo Association, afterwards the American Art Union, came into existence. Its object was, by subscription of five dollars from each member, to secure a sufficient sum to purchase a reputable work of art, and then to reproduce this in popular form, giving each member a copy. The original after being produced became the property of one of the members, ownership being decided by lot. Its praiseworthy aim to increase public interest in native art was pushed with vigor. Many working by day in banks, stores and other departments of public life gave their evenings to this meritorious effort, and many reproductions as well as original works of native artists were thus scattered among the masses. Unfortunately the element of chance introduced in deciding the ownership of the original paintings, brought the movement within the jurisdiction of the law framed for the suppression of lotteries, and the Art Union was forced to disband.

To the National Academy of Design belongs the honor of being the first art society which still preserves its organization. This most admirable society, the parent of all others, has from the start given its attention to the fine arts, and has practically restricted its effort to paintings in oil, with an occasional interest in sculpture. This restriction of necessity caused the formation of the Water Color Society. Societies of etchers, engravers, etc., each having for its purpose the advancement of its particular specialty, and numberless clubs, appeared, partially artistic, partially social in their nature; many had but a fleeting existence. The inevitable differences of opinion regarding theories of painting brought about the formation of the Society of American Artists, and later the Water Color Club.

But through all these years the efforts exerted were in a specific and technical direction. Good schools were formed, but the field was restricted. Each little group interested itself in its own specialty; often so intensely as to be antagonistic to its sister societies.

As yet municipal art slumbered. One of the first signs of the movement manifested itself in the formation of the Art Students' League. This social union was formed on a co-operative, self-supporting basis. A certain technical knowledge was a requisite of membership. The board of control was elective and chosen from those actively at work

PATHWAY OF THE SHORE OF LAKE COMO, ITALY.

in the school. Its success was instantaneous.

The Architectural League carried this idea still further by drawing together in one group architects, painters and sculptors, and in enunciating the interdependence of the "allied arts." A necessity being felt for proper assembly rooms, galleries and school rooms, the Fine Arts Society, composed of the Society of American Artists, the Architectural League, Art Students' League, and many generous patrons of art, was formed. The Fine Arts Building, in Fifty-seventh street, was built, and a suitable center for art effort thereby provided.

Thus, unconsciously to themselves, the artists were obeying the influences of the day, were combining, organizing and endeavoring by concerted action to strengthen the cause of their profession. But still the municipality found little or no place in their efforts or discussions.

The constant contact of the student with European schools and influences could not continue without results. Coming directly from the great foreign centers, he could not but feel the short-comings of his native city. As an earnest endeavor to awaken the slumbering pride of the city, the Municipal Art Society was created. The revenue derived from dues of members was to be used in providing from time to time, as circumstances permitted, one or more public decorations. The wall decoration in the Criminal Court building is the first result of its efforts. The idea, which seemed so excellent, does not appear to have received the sympathy or approval of our citizens. Whether this is due to the fact that the movement started with the artists and not with the laymen has not as yet been determined, but it remains unfortunately true that there is little or no public interest in the effort.

In the groping of the artistic mind for better things, the National Sculpture Society and the National Society of Mural Painters were formed, each with the avowed purpose of furthering the development of art, not only in this city, but in kindred cities throughout the United States.

So many different societies meeting at varied times made united action difficult and tedious. Individual action without conference on important questions seemed unwise. A central committee, composed of representatives from each society, was proposed and the Fine Arts Federation recently formed.

But in studying the development of these societies, leagues and federations, we find little if any of the true communal spirit which made the cities of the middle ages the art centers of Europe. We find the desire to "make any sacrifice for art," "art for art's sake," on every hand. Yet for years these very enthusiasts have tolerated commonplace architecture, obstructed streets, telegraph poles, elevated roads, bill boards, every advertising monstrosity conceived by the human mind, and have, from morning until night, wandered among the worst aggregate of public fixtures ever produced by any city in the world, and have wandered speechless. The evening may possibly have been devoted to "art for art's sake," profound discussion of the impressionistic theory, or the necessity of a closer "study of nature." Absolute truthfulness to life may have absorbed the time and attention of the members, but certainly no organized effort was made by any society until a recent

FOUNTAIN DES INNOCENTS, PARIS.

date to ameliorate the condition of the city. And what efforts have been put forward have been more in the form of criticism than formative action. We hear of protests from societies, objections from leagues and federations, but what creative, aggressive action is being taken by any art organization? How are our individual artists meeting their personal responsibilities to civic art? Is it by allowing the absorption by city and corporate interests of all natural breathing places? Is it by permitting the destruction of all the beautiful old Dutch and Colonial mansions? Is it by allowing the obliteration of historic memories? Is it by giving up without protest, franchise after franchise, grant after grant, until corporate interests become most powerful and a menace to all advance, to all improvement? Is it by permitting the architecture of every avenue to be but the constructional frame for the support for a series of nondescript signs? Is it by permitting each thoroughfare to be filled with telegraph poles, electric lights, lamp posts, execrable in design, elevated roads and other obstructions? Is it in this way he meets his responsibility?

We are told that in London "there is a social movement in art, a strong social movement in politics, and a social movement in the church, having much of the impulse of original Christianity." So, indeed, there must be here a social movement in art before a municipal art can be hoped for—a social movement, deep, strong and tireless. "A pot can not be made to boil from the top." No civic art can be hoped for, if the veriest necessities of everyday life are poor in design and vicious in color. New York can never hope to produce artists who shall rival those of the past, if she neglects to surround them with inspirations to work; if she does not possess that city pride which, in former ages, made each worker strive to make *his* work worthy of *his* city.

While foreigners have been only too anxious to study American institutions, Americans, on the contrary, have treated foreign precedent with contempt. Yet in civic improvements all cities are in advance of our own. Pavements now recognized as the best have for years been in constant use abroad. In the planning of new parks, the arrangement of avenues and boulevards, the widening of old streets, many useful lessons might have been learned, and the lower part of our city saved its present embarrassment. The introduction of boulevards in old Paris, and the widening of streets in congested London, have been shown to be of financial as well as æsthetic value. Shaftesbury avenue improvement is a notable example worthy of imitation here. The government control of advertising placards in Paris, the setting aside of certain prescribed spaces, and their general arrangement so as to make the streets attractive, are but a few of the many minor points worthy of emulation.

The possibility of river fronts in great cities is aptly shown in the treatment of the London Embankment; the utilitarian as well as picturesque possibilities of wharfs in great cities, in the grand series of quays in Antwerp; the use of water as a means of communication in the cities of Holland.

Ten years ago it was suggested to use street placards as an art education medium. The idea was scoffed at, and yet two years later the Société Populaire des Beaux Arts

ROADWAY ON THE SHORE OF LAKE MAJOR.

was formed in Paris, and has since, by its untiring efforts, done much to aid the advancement of public art. And now comes the information that modern Belgium bids fair to rival ancient Flanders as the public art center of Europe. The National Belgian Society for the development of art in its application to street decorations and to all objects of public usefulness, was founded in Brussels in 1894 by a number of patriotic artists for the purpose of restoring to art its social mission of past ages, and of transforming streets from their present ugliness into artistic thoroughfares. It aims also to apply art to modern inventions and appliances. The society has endeavored by means of competition and adequate prizes to enlist the best ability in solving the various problems attacked. The society has received the support of the town councils of Brussels, Antwerp, Ghent, Bruges and others. Subsidies have been granted to be awarded in money prizes to the most meritorious designs. As a result, Brussels possesses not only artistic buildings but artistic shop signs in wrought-iron, porcelain and carved wood. The electric light poles, so hideous in most cities, are graceful creations of the ironmonger's art. Posters and placards are an addition rather than a detraction. Public fountains, street names, electric car waiting rooms, newspaper stalls, telephone boxes, in fact all utilitarian necessities, have felt the artistic influence of this admirable society. Mural paintings and mosaics of merits adorn facades of business buildings, and under the inspiration of this movement Brussels of to-day bids fair to rival the art centers of the past. Best of all comes the news which ought to appeal to every American that "it is profitable"; that by increasing the beauty of their city, they have increased its advantages and attractiveness, and that modern art thus applied "enhances the prestige of a nation, and by encouraging the best instincts of the people, raises their whole moral tone."

Precedent upon precedent might be quoted, but why study precedent when it is impossible to follow? Why cite Paris as a city which has limited the height of tall buildings and hold it up as an example for the American who revels in skyscrapers? Why discuss the artistic sky line of our great city when bill after bill has been defeated at Albany because of the selfish interests of certain corporations? Why point to the boulevards of Europe when it is known that every street extension, every projected roadway must be connected with and subservient to a real estate deal?

The use of private capital and the responsibility of the individual has been urged as the solution of the problem. Many philanthropic men abroad have interested themselves in this good work, and here in New York the "Mills House" No. 1 is an excellent example of what intelligent interest can do. A model tenement, artistic in its architecture, utilitarian in construction, and self-supporting, has been erected in a congested district. Three days after opening, twelve hundred of the fifteen hundred rooms were taken, proving the existence of a demand for such buildings. Here, for almost the first time, the highest ability has been invited to solve the simplest utilitarian problem, and the result has been an unqualified success.

While individual effort in many cases may be, and undoubtedly often is, successful, yet if this effort

ARCADE ON LAKE FRONT, BELLAGIO.

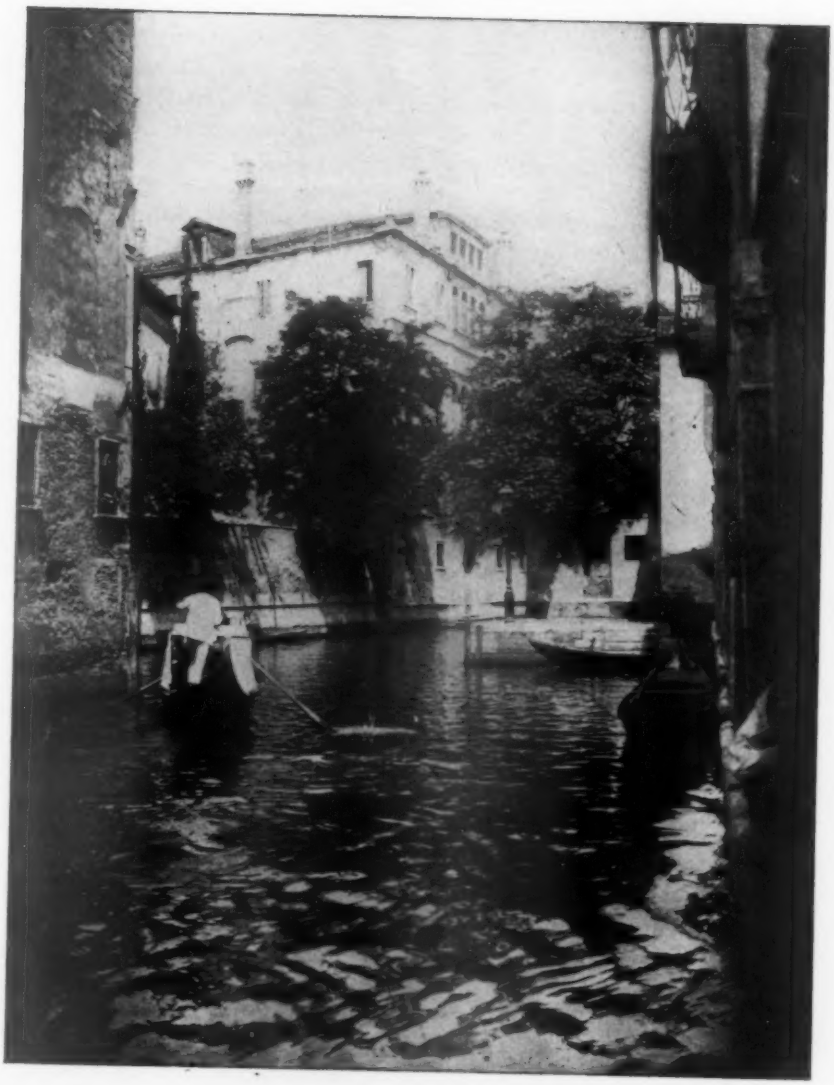
be not applied under organized direction, it is still doubtful if the result will be all that is desired. It is the most stinging criticism of free institutions that municipal action should fail, and individual enterprise perforce be appealed to. If the work of the individual is beyond the appreciation of his times, unless he can educate his contemporaries to agree with him, his good work must inevitably cease with his personal effort.

The exhibition has been suggested as the means of artistic social improvement. Exhibitions have been tried and tried successfully. We learn that seventy thousand poor attended one exhibition on the east side in London, and that similar exhibitions in this city have met with encouraging results. The Kyrle Society is undoubtedly doing good work. But compare for one moment the transitory effect of an exhibition of works of art visited perhaps once or twice during the season with the daily influence of surroundings forced upon the attention by the routine of every-day life. The work of art in its secluded gallery must inevitably seem apart and separated from the life of the laborer, and can not possibly affect him as the public necessities which from constant association become an indispensable part of his existence.

Art must be indigenous to be of value. Art must appeal to the great masses of the public to regain its educational influence. Foreign examples may be studied, and foreign pictures reproduced, but unless art tells the lesson of the human heart, unless the cry of human suffering is echoed there, unless the daily struggle of the individual is felt and recorded, unless all the aspirations, hope and prophecy for the future are expressed, art must of necessity have fallen far, far short of the mark and failed to accomplish its mission. It is this that has been realized by Belgium, which, having a gross population hardly greater than our city, yet has attempted more than our entire nation. It is this which has led to the formation of a society for the development of art, and it is this which has enabled it, in spite of all opposition and pessimistic prediction, to accomplish more in three years than the rest of Europe in double or triple that time. It is this belief in the masses, in their life, hope and aspirations, which has spurred the artists of Belgium and thrown a halo of inspiration around the simplest problem. It is the appreciation of this divine truth, which has made this movement the most earnestly studied, the most readily followed.

We hear on every hand of the "social movement," "social reform," "religious awakening" and "municipal art reform," different names for the same thing; all so closely allied as to be inseparable. No social movement can advance one step without unconsciously enlisting the sister arts. Art and religion go hand in hand.

Picture writing from the earliest days has been man's universal language. Symbols, signs, heraldry are but the shorthand of the mind, and but for the decadence of our art, would to-day supplant many needless mediums. Art has been debased and has become aristocratic in its very inception. William Morris, socialist in theory, publishes his work in limited editions at extravagant rates. Walter Crane, socialist, is willing to have his original plates destroyed to thereby increase the value of the limited number of copies printed. Is it to be wondered that the people look upon art with



CANAL, VENICE.

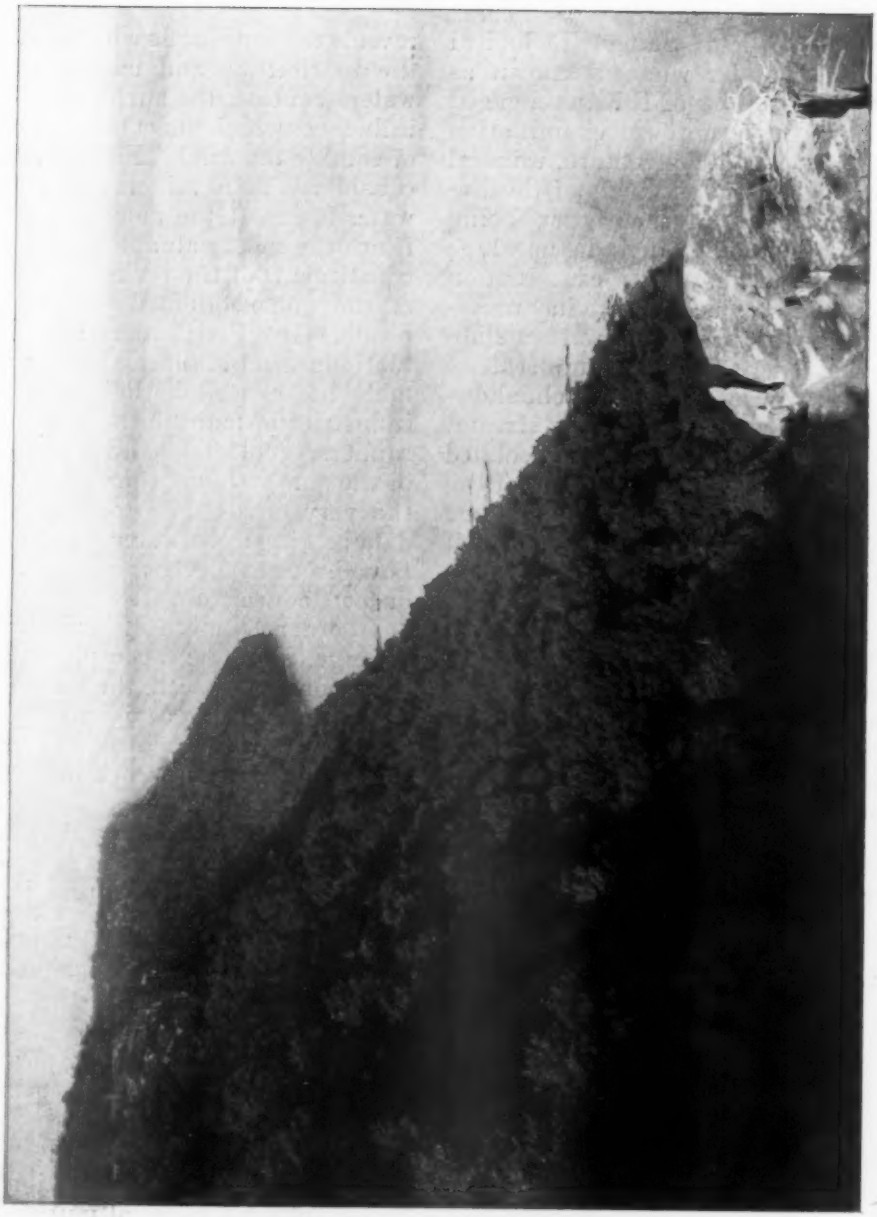
distrust, as but another of the many class distinctions? Should one be surprised to learn that pictures, catering as they do to the luxurious tastes of the wealthy, whether loaned in exhibitions or given in charity, of necessity fail in their purpose?

Let us go back to first principles and again attack the problems of every day life with the experience of past ages to help us. Let us not be led astray by the individualism of the present age. Let us not be deceived by the glamour of easel work, but let us realize that art to be of value must answer the question of utility and not relegate itself to the exclusiveness of aristocratic appreciation. In so far as art fails in this respect, just so far it loses its claim to the title of municipal art, and just so far it alienates the sympathy of the great majority of our citizens. Let the architects devise schemes for historic and monumental buildings. Let our engineers endeavor to solve the problems of technical construction, and solve them in such a way as to obtain the necessary result without violating every æsthetic principle. Let our sculptors so work, that when their statues and allegorical groups are complete, their city is benefited. Let the mural painter in his every effort so work that the simplest object in his hands becomes a thing of beauty. Let him refuse no opportunity, no task however simple, and let his every effort, whether remunerative or unremunerative, be for the beautification of his city and its homes, and let all "allied arts" and kindred professions unite in their efforts to raise *their* home.

Look for one moment at the field for work. The present street fixtures must in time be replaced, and can then be designd under competent supervision. Franchises not yet granted may be so qualifiedly conferred as to insure artistic success. Church property, educational concessions may when bestowed be accompanied with the condition that upon removal, the property must revert to the city at a proper valuation, thus insuring, as the city grows and these institutions follow its progress, the reservation of these small holdings for the use of the city. The exemption from taxation, the many concessions made might at least insure the city the option of purchase at a fair valuation, when the property no longer fulfills its original purpose. Public signs might be required to be more uniform and less obstructive. The recent rapid development of the artistic poster is but one of the many instances of the possibilities in this direction.

Public schools might not only fill their educational province, but be so designed as to form recreation centers for the districts in which they are placed. A slightly increased expenditure could provide assembly rooms, reading rooms and galleries of no small importance. Public entertainments and musical recitals could be given from time to time, and the simple school-house of the past be developed into the model educational building of the future.

Markets, so essential to the life and economical existence of the community, could, instead of being as at present a drawback to the section in which they are placed, be so designed as to contain not only food products, but shrubs and flowers, and the stalls for these could be so placed as to appeal to the most fastidious critic. The union would be to the advantage of both, and as in all true reforms, the public would also be benefited.



THE PALISADES ALONG HUDSON RIVER.

INVESTIGATIONS OF WATER SUPPLY.*

By F. H. Newell, Hydrographer U. S. Geological Survey.

The United States Geological Survey, under what is known as the organic law of 1879, is engaged in making a thorough examination of the geologic structure, mineral resources, and products of the National Domain, the latter being defined by law to include the whole United States. This examination of the geologic structure has necessitated the preparation of an elaborate topographic map on a scale of one or two miles to the inch, showing the location of every stream, road and railroad; of every isolated building in the country, and of the streets and thickly settled portions of towns and cities. In addition it has a feature which distinguishes it from the ordinary maps, in showing by contours or lines of equal elevation the slope and altitude of the surface of the country. Upon this map as a base is colored the distribution of rocks of various kinds and ages, and the relations of the rock layers one to another are shown by vertical sections. Knowing the distribution and character of the various rocks, it has been possible to discuss the mineral resources and to obtain fundamental facts concerning their occurrence and distribution.

In all of these processes of mapping the topography of the country, of studying its structure and of describing its mineral resources, matters connected with water supply have always been prominent. The topographic map shows the location of the streams and springs and the area and slope of catchment basins. The study of underground structure reveals the conditions which govern the distribution and movement of waters beneath the surface and the influences which affect their burden of soluble material. Furthermore, considered as a mineral resource, water is one of the most important if not the most valuable of all the constituents of the rocks, as well as of the unconsolidated surface deposits. Its distribution and fluctuations affect all animal and vegetable life as well as the health and industries of mankind. The topographers, geologists and engineers of the survey have, therefore, from the very outset, had to deal with data bearing upon water supply and have brought together a great body of facts concerning it.

In order to more systematically arrange, digest, and complete these facts connected with the waters of the country, the division of hydrography was created in 1888. From that date the work has gradually extended as experience was gained and the results were found to justify more extensive operations. It now embraces practically three classes of work. The first consists of the measurement of streams in various parts of the country, from Maine to California, and the determination of surface supplies in lakes and rivers. This necessitates operations carried on at intervals through several years and at widely separate points. It also includes the examination of reservoir sites, especially upon the public lands, and the feasibility of using these for increasing the water supply. This branch of the work,

*Read at the meeting of the American Public Health Association, Philadelphia.

which may be considered as the engineering side, is under the immediate direction of Mr. Arthur P. Davis, assisted by a corps of skilled hydrographers, some permanently engaged, but the greater part resident engineers, occasionally employed in various states.

The second class of investigations is more purely geologic in character as distinguished from the first. It consists in the detailed examination of underground waters and particularly of artesian well conditions. This requires a close detailed study of contiguous areas and a thorough knowledge of the structure of the country. Operations are confined mainly to the western half of the United States, where the deep-seated sources of supply of pure water have their greatest value. Studies have been made in particular in the Dakotas, Nebraska, Kansas, and Colorado, and to a less extent in Ohio, Indiana and Illinois, and within the Atlantic coastal region.

The third class of work consists in the preparation of reports upon the best methods of utilizing the water resources, and these include a wide variety of subjects, from considerations of questions of water storage, pumping, irrigation, filtration and other matters pertaining to agriculture and domestic supply. While conducting all of these investigations, each with distinct reference to utilitarian ends, the attempt is made to treat the data acquired in a thoroughly scientific manner and to obtain facts concerning run-off and the laws governing variation of supply, such that the information obtained may be a distinct contribution to knowledge. The results of these investigations are applicable primarily in considerations of water supply for agriculture and for power or for industrial purposes. The sanitary side, however, while it has been less conspicuously presented, has not been neglected, and might properly at this time be brought forward more prominently.

Questions of municipal supply, of stream pollution, and kindred topics, must be discussed primarily from the geologic or engineering side; that is to say, the first thing to be considered is that of location, topography, area and catchment of drainage basin, and in the case of underground waters the geologic structure, character and mineral contents of the rocks, rate and distance of percolation, and other minor points which can be determined satisfactorily only when a topographic map is at hand with geologic data and facts as to quantity and fluctuation of the amount of water. The topographic map for the whole United States is progressing rapidly and also the knowledge of geologic structure. At the same time the division of hydrography is bringing together facts concerning the daily flow of typical streams in various parts of the United States; is showing how the quantity varies from day to day; the amount and duration of floods and of low water, and other details concerning the regimen of streams. It is also studying the behavior of water underground; its rate of percolation or flow, and showing as far as possible by maps the distribution of waters beneath the surface and the depth of water-bearing strata, so that it will be practicable, in certain areas, at least, for any person to ascertain in a general way before putting down a well the depth and probable character of the rocks from which a supply of water should be obtained.

These fundamental facts regarding quantity are supplemented by

general information concerning quality, especially from the side of inorganic or mechanical impurities. The amount of material carried in suspension is governed to a large extent by the quantity of water and changes in the rate of flow, the floods at their onset picking up enormous amounts of dust, sand and gravel, and becoming relatively less turbid as the volume increases, then clearing with subsiding water. Geologic data in regard to erosion and sedimentation are acquired, these being locally applicable to considerations of the sanitary condition of municipal or domestic supplies. The organic or bacteriologic side is of course a matter for others to determine, but the samples of water obtained by hydrographers have been made available for studies of this character.

As illustrating the application of this data mention may be made at this time of recent hydrographic measurements carried on within the drainage basin of the Potomac river. For several years measurements of the discharge of this river and of its larger tributaries have been maintained at a few points, giving the daily flow. At the time of the recent drought in August and September, 1897, a systematic reconnaissance was undertaken, the hydrographers visiting and following down each tributary, making frequent measurements of the quantity, noting water powers and incidentally sources and amount of pollution. A small number of men, equipped with light instruments and traveling for the most part by means of bicycles, passed over the ground, rapidly obtained the facts concerning the flow of the stream, and took samples of the water, mailing these immediately to the laboratory of the Marine Hospital service. There the samples were examined bacteriologically, and in a few cases chemical analyses were made. The results have not as yet been officially announced, and it would be premature to offer final conclusions, but from the progress report of Mr. Arthur P. Davis, the following facts have been compiled.

The main source of pollution of the Potomac is at that portion of the headwaters in the vicinity of Cumberland, Md.; other streams, including, the Shenandoah, being relatively unobjectionable. The minimum flow of the river at Cumberland is a little less than sixty cubic feet per second, while the minimum discharge above the city of Washington, near the intake of its water-works, is over fifteen times as great. Thus, at times of low water, when the pollutions bear the largest ratio to the total supply, the distinctly bad or dangerous water from the vicinity of Cumberland is probably not more than six per cent. of the volume at the head of the Washington aqueduct. This six per cent. of polluted water has, however, traversed about 190 miles of broad river bed, broken by numerous shoals freely exposed to light and air. Assuming that the progress of the water is on an average two miles per hour, it would require ninety-five hours for the sewage from Cumberland to reach the Washington aqueduct, or very nearly four days. Although considerable improvement might take place during these four days, still it can not be claimed that these conditions are desirable or proper.

These are the elementary facts of the case. To go into the matter of pollutions a little more definitely, it may be noted that on the headwaters of the north branch of the river are eighteen saw-mills discharging their sawdust directly into

the stream. Besides these are several tanneries pouring effluents directly into the water, and at one of these the refuse tan bark is placed where it will be washed away. Numerous mines also contribute coal dust and drainage waters heavily charged with iron and other mineral matter in solution. At Luke, Md., a small village about thirty miles above Cumberland, is located a large paper mill with a capacity of more than one hundred tons of paper per day. This is made from wood, disintegrated by chemicals and heat, the refuse being discharged into Potomac river at the rate of over 100,000 gallons per day. Below this mill is the town of Piedmont, W. Va., contributing offal to the stream. On the opposite side, at the town of Westernport, Georges creek debouches, bringing in the drainage from several thickly settled communities and about twenty coal mines. These waters are exceedingly bad, although apparently clean. At Keyser are a number of factories, including a tannery and a woolen mill, each with its characteristic effluent. At Cumberland the drainage water from several mines and the refuse from a paper mill, brewery, distillery, cement mill, tannery, dye works and gas works is brought in by Wills creek. Below the mouth of this stream is a tight dam raising the waters of the Potomac and ponding them for nearly three miles. This relatively dead water receives all of the pollution above noted, together with the sewage of Cumberland, a city of 15,000 inhabitants. About four hundred yards above the dam is the intake of the Cumberland waterworks, supplying a fluid whose qualities have long been a cause of extreme dissatisfaction.

The south branch of the Potomac and other tributaries down to Harper's Ferry, the junction of the Shenandoah, were found to be relatively clean, the only causes of pollution of note being several tanneries. In the Shenandoah valley are also a number of tanneries and small manufactories, with drainage from small agricultural towns. At Harper's Ferry are pulp mills, one each on the Potomac and Shenandoah. Below Harper's Ferry are no pollutions of consequence down to the intake of the Washington water-works.

During the period of high water the Potomac is swollen to a volume of from 100,000 to 200,000 cubic feet per second, and at such times the dilution of the sewage is extremely great. But during the periods of low water, mainly from July to November, the dangerous water from the upper river reaches a relatively large volume, as shown by the systematic measurements. These figures, although they do not develop anything which has not been before known or suspected, yet serve to put definitely upon record facts which when publicly understood can not fail in producing a decided strengthening of public sentiment in favor of control of pollution and filtration of water supplies. Nearly every river of the United States of considerable size receives its waters from two or more states and with these pollutions, much of which might be done away with at moderate expense. In rare cases any one state can control the character of the water flowing within its boundaries, but this matter, if rectified at all, must be through some interstate or federal control. It has been demonstrated again and again that purification of sewage by filtration or by irrigation is practicable and can be conducted at reason-

able expenditure, and it is to be hoped that the time is rapidly approaching when public sentiment will be aroused to the degree of compelling such filtration whenever public health and comfort are imperiled. Toward awakening such public sentiment the division of hydrography of the geological survey is trying to do its part by presenting definite facts clearly and impartially and showing what are the character and limitations of the natural water supplies and how these may be utilized and protected.

RANDOM NOTES ON THE CONSTRUCTION OF BRICK PAVEMENTS.

By E. A. Kemmler, C. E.

I have studied the specifications for brick streets of a number of the larger cities, and this article will consist of a review of the salient principles of street construction, as laid down by the different specifications. It will be my endeavor to point out the good and bad features as I see them. Among the specifications referred to are those of Buffalo, Cleveland, Cincinnati, Louisville, Kansas City, Mo., Omaha, St. Louis, Detroit, Philadelphia and Providence.

Nearly all specifications are satisfactory in respect to the preparation of the sub-grade by rolling and removing spongy material, but only one (Louisville) requires the material in embankment to be rolled and compacted in thin layers, as it should be, for the inherent weakness in all improved streets lies in the possibility of settling.

It may be laid down as a cardinal rule for the entire structure that every possible chance of settling or movement among the materials must be avoided if the smooth, reglar surface of the pavement is to be preserved.

I believe that it would be better tc prescribe the weight per inch of the roller, instead of its gross weight, as is done in most cases. I also believe that the horse roller is a relic of barbarism, and ought to be abolished in street work, as it has been in seventy-five per cent. of the cities considered. Every city ought to own and operate a roller of its own and charge the contractor a fair price for its use. In Detroit the charge is one cent per square yard of surface.

Curbing—Two cities require the curb to be bedded on and backed by concrete as it undoubtedly ought to be. All others use sand or gravel, the thickness of the bed varying from two to six inches. The alignment and grade of curb set in this manner will suffer according to the thickness of the bed, and the number of rains during the work. If sand or gravel must be used the tendency to settle down and shift ought to be reduced to a minimum by making the bed thin; in my opinion, not more than two inches.

Foundation or Ballast—Herein lies to the greatest degree, as I believe, the success or failure of a brick pavement. The foundation ought to be as near perfection as to stability and soundness as it is possible to make it. Cleveland and Columbus are the only cities, of those considered, which do not

use concrete in the foundation; Cleveland probably because most of the streets are built on a solid rock sub-grade, and Columbus on account of its greater cost over other material.

Cleveland uses unscreened gravel or bank sand, puddled; Columbus crushed limestone or limestone bowlders and bank sand rolled into the upper voids.

In this city an eight-inch gravel foundation can be prepared for 20 cents per square yard; crushed bowlders, 25 cents; crushed stone, 27 cents; six inches of concrete, 55 cents.

It requires no extensive argument to prove the comparative inferiority of both gravel and crushed stone as a foundation material. Neither can be made uniform in hardness and soundness, nor can the constituent elements be prevented from moving among themselves after the pavement is completed.

According to Trautwine, crushed stone has from forty to fifty per cent. voids. When the sand is spread upon and rolled into a stone foundation, perhaps one-half of these voids are filled, principally in the upper layers. Apparently the mixture is compacted into a solid mass, as indicated by its appearance on the surface. But in reality the sand grains are in unstable equilibrium, liable to be disturbed by every impact upon the pavement; readjustment must follow, and the sand has a tendency to work its way to the bottom, its place being filled by the material in the paving bed, and the result is, depressions are formed which are both unsightly and disastrous to the life of the pavement.

Still another objection will apply to a crushed bowlder foundation. Eighty per cent. of the material used in some cities under this name consists of pebbles too small to be affected by the crusher. The result is, there are no sharp, ragged points to give the fragments a hold upon one another, and it fails to pack readily under the roller, unless buried under loamy sand. When the sand wagons come upon it after being rolled, the wheels cut in and destroy to a large extent the work of the roller. I am sure that it would be better for both gravel and stone foundations to require the paving sand to be brought on in wheel-barrows rolled on boards, just as it is done on a concrete foundation.

In order to obtain the best results, I believe that a concrete foundation is essential, especially on avenues having street railway tracks.

Paving—The usual manner of bedding the brick is upon a cushion of sand, one to two inches thick, smoothed and shaped to the crown with a wooden template.

I consider the sand cushion the weakest feature of a pavement laid on a concrete foundation, because it is an unstable material and should therefore be as thin as practicable; in my judgment, one inch is sufficient.

All specifications considered require tamping of the brick when laid, and the majority of them rolling in addition, to produce a smooth, finished surface.

Cleveland and Philadelphia use a special block made with one-eighth inch projection on the vertical sides, to insure open joints for receiving the filling material. The only objection I can see to such a block is that manufacturers will not make it unless it is ordered, and then they can not supply the block as fast as they are needed.

Filling the Joints—For filling the

joints Omaha uses bank sand; Cincinnati, Detroit, Louisville and Columbus coal tar pitch numbers 5 and 6; Cleveland and Providence a mixture of coal tar and asphalt; Philadelphia, Brooklyn, Kansas City, St. Louis and Trenton, N. J., a cement grout, composed of equal proportions of lake or river sand and Portland cement.

It seems to me that the office of the filler is twofold, to prevent water from reaching the foundation, and to protect the edges of the brick. In order to meet both of these requirements, every joint should be filled to the top and remain there, wearing down with the brick.

I do not believe that sand fills the requirements, nor have I a high opinion of coal tar as a filler. By using extraordinary care the joints may all be filled by flooding the pavement with the tar at 300 to 400 degrees, and sweeping it into the joints, and by going over some portions twice. But on hot summer days the tar melts and flows, following the law of gravitation, and settles in the gutters, forming a black, unsightly scale, sometimes as much as an inch thick. The joints, partially deprived of their filling material, become filled with water, mud and ice in turn, and these elements, aided by the impact of the tires of wagons and shoes of horses, are fatal, at least to the appearance of a street, if not to its life.

I am not familiar with the manner in which filler composed of a mixture of tar and asphalt acts, but the engineer of street construction and maintenance in Brooklyn informed me that as a result of his experience he now prefers a mixture of 80 per cent. coal tar and 20 per cent. refined asphalt to all others.

The grout filler has been used in Columbus with ill results and was abandoned, the cause of failure being attributed to the filler. It was reasoned that such a pavement, being practically inelastic, expands under summer temperature sufficient to raise it up from the foundation and cause it to act as a series of arches or domes. This claim is certainly substantiated by the hollow, rumbling noise produced by the passage of vehicles over it; the pavement seems to act as a sounding-board for the air between it and the foundation. It is also a fact that such pavements have failed at a number of points, in rectangular patches, sunken bodily as much as four inches in places. Occasional cracks as much as a hundred feet in length can also be found.

But I can not attribute all of these phenomena to expansion alone. In the first place the majority of streets are paved in summer. Then, again, expansion does not account for a drop of three or four inches, and nothing but a settlement of the foundation will.

The feature of the grout filler which makes it a desirable material for the purpose, is its preservative effect upon the brick, especially the soft and the overburned brick. During the summer of 1892 two streets of almost equal areas, namely, Summit street, from Warren to Woodruff, and Third street, from Fulton to Reinhard, in Columbus, were paved, both with Hallwood block, the former with grout filler, the latter with tar. The cost of the former was $1.90 per square yard, or $47,790 in all; the latter $2.10 per square yard, or $44,365 in all. The travel on Third street is probably a little larger than on Summit street, but it also has a much firmer foundation. I have made a care-

ful examination of the two streets in order to approximately estimate the amount of repairs necessary to restore them to a fair condition. Nine hundred square yards of new brick at 90 cents per square yard, or $810, will place Summit street in probably as good condition as any five-year street in the city. But in order to put Third street in as good condition, no less than 6,000 square yards of pavement would have to be taken up and relaid with new block at a cost of $5,400. I can trace this great difference to no other point than the filling material, and believe that a hard and permanent filler is necessary to cause the brick to wear instead of chip and go to pieces.

Brick Tests. — Buffalo, Kansas City and St. Louis require the brick to undergo certain tests before acceptance.

The St. Louis specifications, which represent the latest knowledge on the subject, are as follows: The brick shall have a modulus of rupture on cross breaking of 2,500 pounds per square inch. It shall sustain a loss of not to exceed 30 per cent. of its weight on being subjected to 1,800 revolutions in a standard rattler, each sample being tumbled by itself.

The Buffalo method is to tumble the brick with a mixture of scrap and pig iron; the absorption and specific gravity tests are also given considerable weight.

I will state briefly, for the benefit of those who have not read the report of the Paving Brick Commission of the National Brick Manufacturers' Association, the conclusions reached by this commission:

1. The absorption and specific gravity tests are absolutely unreliable and misleading in determining the quality of a brick for street purposes.
2. Crushing and transverse strength bear no fixed relation to the other properties of a brick.
3. The test for abrasion should be the only official test.
4. The only reliable results obtainable from the abrasion test are produced by tumbling each variety of brick by itself, without any admixture of other brick, stone or iron.
5. End cut brick are greatly superior to those made with side-cutting machinery.

All of these conclusions are the result of numerous experiments. The fourth conclusion leads to the question as to whether the comparative wearing qualities of different varieties of brick can be determined by the abrasion test. The numerical results of Prof. Orton's experiments, as well as his conclusions expressed in the report, seem to indicate that they can not. His words are: "A brick can only be expected to give its characteristic rate of wear when tested alone, without the use of any other brick."

Since each variety of brick has, then, its characteristic or peculiar manner of wearing and chipping, it seems to me illogical to specify a certain minimum rate of wear, referring indiscriminately to any kind of brick. It would seem more in keeping with the results obtained to omit the numerical ratio altogether, and compare each example of brick tested with a standard brick of that variety. I believe, however, that comparative tests can be successfully made by laying the various standard brick side by side on the same street, so that the conditions for all will be the same, and measuring the actual loss of each from year to year.

Maintenance and Repair—This is a subject so large in itself as to permit of but a passing consideration in this essay. All cities require a guarantee from the contractor to keep the street in good repair for from one to ten years.

Certainly no one will question the necessity of some plan, not only of maintenance, but also of

proper attention to the opening of streets by sewer and gas trends and replacing the material thus removed. In order to secure efficiency all of this work should be done by the city or under its supervision. Persons securing licenses to tear up a street should be required to make a deposit covering the cost of restoring its pavement and the balance over and above its actual cost returned to them.

A repair fund for streets is a crying necessity. The contractors' guarantee for five or ten years is too short, even if performed faithfully. To turn the street over to this element is almost criminal, besides being a bad financial policy.

PORTLAND CEMENT TESTS FROM THE MANUFACTURER'S POINT OF VIEW.

By John W. Dickinson, Mem. Western Soc. Engineers.

The experience of those using large quantities of Portland cement proves the necessity of close inspection. Major Marshall, government engineer at Chicago, Mr. T. T. Johnston, of the Chicago sanitary district, and General Sooy Smith, engineer of the new government building, in Chicago, have used several hundred thousand barrels in the past few years, and in all cases, supplies have been limited to comparatively few brands selected on account of good results obtained in preliminary tests, and yet with this precaution, tests are made of all cement as supplied on their work, and results have shown that such testing is absolutely necessary in preventing the use of inferior cement.

Now with the precautions taken above, and with the great care used by those supplying the cement for work of such character, where tests are frequently published and any rejection is disastrous to the reputation of the cement, what shall be said of the probability of poor cement finding its way into work where it is known beforehand that *no* inspection tests will be made? We have in this country cement manufacturers of the highest ability and integrity, but these reap little benefit for the conscientious and painstaking efforts so long as inferior cement, costing much less per barrel to manufacture, is accepted in competition. So, not only is it of vital importance to test cement to insure the best results, but it is also only justice to the reliable manufacturer, and by enlarging the scope of cement testing, and so encouraging the manufacturers of the highest grades, the greatest incentive possible will be given for the continued improvement in the cement industry, with consequent benefit to the engineering profession.

Great strides have been made in the improvement of Portland cement, especially in the more perfect preparation of the raw material, increasing the amount of actual cement in proportion to the clinker produced and by finer grinding of the clinker; and it is safe to say that to-day the average barrel of Portland contains 10 per cent. more of actual cement than the same weight barrel contained eight years ago, and as this improvement has been confined to a compara-

tively few mills, it will be seen that the advance made by these few has been very marked, raising, as it has, the average of the whole production to such an extent. It is with great satisfaction that I can state, without fear of even contradiction, that the advance in manufacturing methods and in fine grinding has been led by the United States. So that to-day there are brands of American Portland that are superior to any manufactured in the old world. Prejudice will not show this; TESTING WILL.

The boiling test is the most severe, but fortunately one of the easiest and simplest, as pats can be made of neat cement, and after setting is complete, placed in any convenient vessel and kept in boiling water for six to ten hours. This test discloses promptly lack of permanency of volume, or unsoundness, which use may not show in years.

Strong objection to this test has been made by many manufacturers, and some of our leading engineers have claimed that certain lots of cement have failed to stand it, and yet the same cement showed good results in the work. I think it will always be found that work done with cement capable of withstanding this test will prove superior after a number of years to that done with cement failing to pass this test. Certain it is that no perfect Portland ever failed to pass the boiling test, and I have never seen one that failed that a critical inspection of the manufacture or a chemical analysis did not disclose some imperfection. Therefore, as most authorities agree that a cement standing this test is reliable, and many of the best experts consider it of vital importance, it would appear only the conservative course to adopt it as a necessary qualification.

In this connection I will state that several of the manufacturers in this country and abroad who formerly opposed this test have, within the past few years, so improved their methods and formulas that their product now often passes this requirement, and I prophesy that in a very few years all technical users of Portland cement will require this specification.

I also suggest that where tensile tests are made less reliance be put on neat tests and more importance be placed on sand tests, and that with four and five and even six parts of sand to one of cement. By such tests the relative value of different cements can be determined. Cement is used only to bond other materials, and the cement mixed four to one, that is equal in strength to another mixed three to one, is of course better and more economical to use, even at 10 per cent. to 15 per cent. greater cost. The only portion of a barrel of cement having any cementing property is that which has been ground to a flour. I incline to the opinion that all the residue on a 200 sieve is practically inert. On this point I give the following result obtained by Mr. C. J. Wheeler, chemist of the Bronson Portland Cement Company, whose experience and ability entitle him to a position in the front rank of the cement chemists of the United States. I quote his words:

> The residue from which the tests were made was that remaining on the 150 sieve. This was washed with water until all of the dust was eliminated; it was then made into briquettes and pounded into the molds. The excess of water was taken up with blotting paper, and the molds were taken off at the end of forty-eight hours and the briquettes put into water; at the end of seven days the briquettes would fall to pieces, when an attempt was made to take them from the water; at the end of one year about the same result was obtained. In other words, the experiment showed that a cement that would not pass a 150 sieve when mixed with water and al-

lowed to lay in water one year, had very little, if any, tensile strength.

Mr. Wheeler informs us that he has started upon a similar experiment which will be made on broader lines, and I would like to see other engineers also enter upon this line of investigation.

Should this contention be proved correct, then other features being the same, the value of different cements will be in direct proportion to the fineness on the 40,000 mesh sieve.

Taking a cement which is 85 per cent. fine on this sieve, and calling the residue cement sand, we have, with a four to one mixture, the following:

85 % of 380 lbs.	=	323 lbs. cement.
15 % of 380 lbs.	= 57	cement sand.
4 bbls. sand—		
310 lbs. each	= 1240	lbs. sand.
Making a total of	1297	lbs. sand to 323 lbs. cement.

Or a proportion of one of cement to four of sand.

Now with a cement of 65 per cent. fine, mixed only three to one, we have the following proportion:

65 % of 380 lbs.	=	247 cement.
35 % of 380 lbs.	= 133	cement sand.
3 bbls. sand—		
310 lbs. each	= 930	lbs. sand.
Making a total of	1063	lbs. sand to 247 cement.

Or a proportion of one cement to four and three-tenths of sand.

It is seen that the proportion of sand to cement is actually less with the first cement, mixed four to one, than with the second cement, mixed three to one, and I have proven by many tests that the first mixture is the stronger, as of course it should be.

The use of Portland cement in the United States is still in its infancy. A glimpse into the future may be had from the towers of the Grand Central depot, New York, where Portland cement is being employed for the entire exterior of this important and magnificent building, and that in a city having at its doors other building material of the finest quality and great variety. American skill, American capital and American labor are equal to the task of supplying this country with the best Portland cement in the world, and sufficient to meet any demand. Let us then together, by judicious care in the use of only the best, so encourage and elevate the Portland cement industry, that it may occupy the position it deserves among the important products of our country.

THE QUESTION DEPARTMENT.

[By Charles Carroll Brown, M. Am. Soc. C. E., for MUNICIPAL ENGINEERING.]

IS CONTAMINATED WATER PURIFIED BY FREEZING.

1. Will freezing purify contaminated water and kill or remove the germs of disease?

2. What, in your opinion, would be the sanitary condition of ice cut from a stream below where it receives the wash from a packing house, through an open sewer, and also an open sewer which drains one-half of a town of 4,000 inhabitants.

Sanitarian, Paola, Kan.

1. Many so-called disease germs are killed by cold, but there are some which will exist an indefinite length of time in ice-cold water or in ice itself, and apparently retain their vitality and power of reproduction under favorable conditions when the ice is melted.

There is a tendency in the formation of ice crystals to reject everything but the pure water, so that if formed under very favorable conditions the ice is very nearly pure. If formed too quickly,

impurities in the water may be caught among the forming crystals and so imprisoned to contaminate the water obtained by melting the ice. The same may happen when stagnant water is frozen and when the water is excessively polluted. If the pond is shallow, so that the water is frozen to the bottom, all the impurities in the water may be found in the ice. Another prolific source of impurity in ice is the process of flooding ice to hasten its formation. This amounts to the same thing as making a shallow pond on top of the ice and freezing it solid, thus imprisoning all the impurities in the water and all those which have collected on the surface of the ice and in the snow which has fallen on the surface, and which is thus turned into fairly solid ice. The number of bacteria in snow-ice is always many times that in clear ice. If all the conditions of freezing are favorable, slow formation, some current, deep water, and no opportunity for water to flow over and freeze on top, quite pure ice may be obtained from water containing a considerable amount of impurity if the snow and snow-ice are carefully removed, before the ice is gathered. The purity of such ice can not be guaranteed, however, especially if any of the conditions given are not entirely favorable.

2. The answer to this question is indicated above. The chances are that some of the ice will be cut in an eddy where it will form rapidly and where the impurities will gather, that some of it will be frozen to the bottom, and also, that some water will at times flow over the surface of the ice, any of which conditions will give opportunity for considerable polluting matter to be collected in the ice. Its purity can not be guaranteed under the best of conditions when formed from water containing the polluting matters named, notwithstanding the probability that samples of ice can be carefully gathered which will be entirely free from germs and will be very nearly chemically pure.

MEASUREMENT OF THE FLOW OF WATER.

1. How many gallons of water are there in a miner's inch?

2. How many gallons a minute will the following measurement make: Stream is 30 inches wide, 2.5 inches deep, flowing 22 inches in 22 seconds.

C. Basye, Neosho, Mo.

1. The answer to this question depends upon the definition of miner's inch, which varies greatly in different places. Thus in some places a miner's inch is the water flowing in a constant stream through an opening one inch square with a depth of water above the top of the opening of 4 inches, in another 5 inches depth, in another 6 inches; in others the depth of water is measured to the center of the opening. In other cases larger openings and other heads are used, and the discharge is given as 10 miner's inches, 100 miner's inches, etc. In the Nebraska irrigation law the miner's inch is defined as the quantity of water flowing through an orifice 1 inch square, with a depth of water over the top of the opening of 4 inches. The law also states that 50 miner's inches shall equal 1 cubic foot a second (7.5 gallons a second), although the discharge through the orifice is actually nearly 10 per cent. greater than this. If the head on the top of the orifice is 6 inches for a miner's inch, about 40 miner's inches will equal 1 cubic foot a second, or 1 miner's inch is about 11.5 gallons a minute. The character of the edges of the orifices is

not fixed, and variations in this may also produce variations in discharge.

2. Assuming that the sides of the channel are smooth and that the velocity given is the mean velocity, the discharge through this channel would be 19.5 gallons a minute. If the velocity is observed by a float, however, the mean velocity has probably not been obtained, and the effect of wind and of cross-currents from inequalities or roughness in side and bottom of channel may be quite marked. The probabilities are that the discharge is less than the figure given by 10 per cent. or possibly more; also, if the surface is not perfectly smooth the float will not give the true velocity. The measurement of such small quantities of water is liable to large percentages of error unless made on a carefully designed weir with accurate instruments.

[By J. W. Howard, B. L., C. E., for MUNICIPAL ENGINEERING.]

CONDITION OF ASPHALT PAVEMENT REQUIRED AT END OF GUARANTEED PERIOD.

What conclusion did the American Society of Municipal Improvements reach as to how to define an acceptable condition of an asphalt pavement at the end of the five year or other guaranteed period?

M. A. Jackson, C. E.

The special committee of that society, who made the report on street pavements, which was published in full in the December and January issues of this magazine, recommend in brief that the surface of the asphalt pavement shall not show more than one-fourth inch wear in five years, or one-half inch in ten years. All disintegrated places must be renewed. Elevations and depressions of three-eighths of an inch must be brought to the general level. Cracks must be cut out and filled with new material. For full information see the entire report.

DISTILLATION OF ASPHALT OR BITUMEN, PETROLENE AND ASPHALTENE.

Can you give us the form of apparatus best suited to the fractional separation of petrolene and asphaltene?

Wade & Wade, Los Angeles, Cal.

This question is important and is evidently from persons familiar with chemistry and laboratory work. It can be answered only with such a supposition. Few chemists ever handle hydrocarbons and still fewer the bituminous substances including asphalt. There is no such single substance or material as "petrolene," nor such as "asphaltene." They are names only, and are used by a few persons to indicate, as "petrolene," those compounds in a bitumen (glance pitch, asphaltum, maltha, etc.) which are soluble in a standard naphtha; the balance or other hydrocarbons and compounds which are not soluble in the naphtha of a chosen standard gravity are by some persons named "asphaltene." The "asphaltene," so-called, must be soluble in carbon-disulphide, although this is also a solvent of the whole true complex bitumen found in a crude asphalt, etc., presented for examination.

There is no need of any special apparatus for making solutions. But "fractional separation" refers generally to fractional distillation, and if this is desired it is necessary to take a very small glass retort, weigh it, fill it about one-third full of the bitumen or asphaltum, weigh again and then by means of a "chemist's oven," or "sand bath," keep the temperature at the heat desired, say 400 degrees F. for the

time desired. Then weigh what is left. A few persons have attempted to establish an arbitrary degree of heat, at which to hold the asphaltum for an arbitrary time, and then call the complex gases and oils, etc., which have been distilled away, by the single name "petrolene," and that which remains "asphaltene." It is best to state at what different temperatures the distillations took place and for how long at each temperature. This brings out the characteristics of the bitumen under test, better than any other way. It is seldom necessary to condense and preserve that which is distilled away when the tests are made upon asphalts for paving purposes. Weigh only that which remains at the different temperatures and in the little retorts.

ASPHALTUM PAINT INGREDIENTS.

We want a good paint for iron bridges and roofs, to be applied with a brush. Can this be prepared with asphaltum or maltha combined with oxide of iron as a pigment? What is the best solvent or drier to use?

H. E. Percival & Co., Galveston, Tex.

This question involves far more than can be answered in the brief way necessary in this magazine. The chemical and physical properties, the methods of mixing, temperatures and proportions used become matters which must be known and studied separately. If you have never made paints nor varnishes, it is best to first employ some one who has experience, and who can make the trials and tests needed in each specific new case. You must select an asphaltum which does not become too soft in summer weather. The malthas in crude state are of no value, and they must be refined, practically distilled to become stiff and almost brittle before of any value in paint. Select a stiff and somewhat brittle asphaltum, such as a gilsonite, nitrate or glance pitch, rather than a maltha.

True iron oxide is generally too heavy a pigment and hard to keep uniformly mixed with the solvents, asphaltum, etc. But in the form of certain ochers it is a hydrated ferric oxide and can be used. Select, if possible, an argillaceous ocher in preference to a calcareous ocher. This is easiest selected from the yellow ochers. The brown and red ochers have usually been calcined and are changed and made heavier. However, some heavy red ferric oxide can be well used.

The usual solvents and driers to use with asphaltum paints are carbon-disulphide, naphtha, or petroleum ether, benzine and certain proprietary solvents. A little linseed oil adds very much to the pliability and elasticity of an asphaltum paint or varnish.

BY WAY OF COMMENT.

Responsibility for Defects in a Water-Works System.

A recently constructed system of water-works for a small city was begun under a franchise prepared by the promoters of the scheme, granted by the city, and transferred to a company organized to operate the works. There does not seem to have been a competent engineer connected with the works in any capacity whatever. Not to speak of the inability of the company to fulfill the contract assigned to it, the troubles of the city are

numerous. It is unable to use the water for domestic purposes during a considerable portion of the year on account of the failure of the company to clean the reservoir site properly; it is unable by any possibility to secure sufficient water or great enough pressure for fire protection, and its streets are encumbered with pipes which are too valuable to be thrown away, but which are on this account an actual detriment to the city, since they are occupying the place which should be taken by pipes large enough to furnish the supply of water necessary to successfully cope with a fire. It is probable that the city and its inhabitants will suffer for many years on account of this inadequacy of the system and pay in loss of pressure, inadequate supply of impure water for domestic purposes, breakage of mains with injury to property and streets on account of excessive pressure in attempts to supply water for fires, shut downs for repairs to engines, reservoirs, pipes and fixtures. This city is only one of many in similar condition. A casual reading of the franchise by an experienced engineer, or even by a young student with a fair theoretical knowledge of hydraulics, would be sufficient to show the absurdity of the requirements of the franchise and the utter impossibility of fulfilling them. The city council is frequently disposed to say: "We do not know about the engineering points. They promise to give us what we want and they ought to know enough not to promise what they can not do. That is their look out, not ours." But when the applicant for the franchise is almost equally ignorant, the time comes when the works must be accepted or rejected. Then pressure is brought to bear and a complete or qualified approval is likely to be given, and the city will stagger along for years in constant trouble about its system, and wasting over and over the small amount of money that a competent engineer would receive for his advice in framing the franchise. And when the applicant for franchise is a promoter who unloads as quickly and completely as possible upon some uninformed and unsuspecting capitalist, he does not care what is promised so long as it has sufficient show of possibility not to prevent the sale of the franchise. In either case the city pays a large bill, whether the company pays any part of it or not, and the council is almost criminally negligent of its duty.

Sewer Flushing. Albany, N.Y., and San Antonio, Texas, are discussing the filthy condition of their sewers and the methods of remedying it. The sewers of Albany are filthy because they are old; not built carefully to line and grade; some have flat bottoms, perhaps originally of wood which has rotted away; admit street water as well as sewage and are therefore large to carry storm water, and subject to

deposits when only house sewage is flowing on account of the shallowness of the stream spread over the wide flat bottom, the pools formed by defects in gradient, and the consequent lack of force of current to carry away the heavier matters washed into the sewers from the streets and elsewhere. On the other hand the sewers of San Antonio are new, have been designed to carry house sewage only, have been well constructed, with the exception of a few minor defects, it is reported, have reasonably good grades and are supplied with ample flushing apparatus in the form of automatic flush tanks and frequent manholes for admission of cleaning apparatus. There have been numerous changes in the political complexion of the city government during the process of construction and nearly as many changes in the personnel of contractors. It has seemed necessary to each new city government to make attacks on the motives and the results of its predecessors both during the campaign and after accession to office. Some of the officials of the present city administration attack the work of nearly all those connected with the design and construction of the system from the consulting engineer down, and, according to the newspaper reports, are giving as much color as possible to the cry of defective design and construction by neglecting ordinary inspection and care, and failing to keep the flush tanks in operation. An investigation of this apparatus shows it to have been well constructed and to be ready to perform its duty. Some "inverted siphons" were necessary to carry the sewers under the river, and a sufficient flow of water to keep these running full is necessary, so that more flushing water is needed at the present time than will be necessary when more connections are made and the flow of home sewage is greater. This makes it very easy for a little neglect to cause deposits with consequent bad odors and stoppages. When the demands of political animosities are so great as to lead to such trifling with the safety and the rights of the people in the attempt to discredit political opponents and their employes, it is time for the independent thinking taxpayers and voters to rise and place in office men with more honesty of purpose and devotion to duty.

It is evident that what is necessary in San Antonio is proper management of flush tanks and regulation of the amount of water flowing through the inverted siphons, accompanied by removal of such accumulations as have been made on account of neglect. In Albany it is proposed to apply an English device for cleaning the sewers, consisting of a pipe having several streams issuing at angles with its length, a hose being attached, so that as the pipe is drawn through the sewer the streams will thoroughly wash the walls of the sewer, the water then forming sufficient current to carry off all sediment. Storms do not thoroughly clean

storm water sewers, for the flood leaves deposits on the sides, and even the top of the sewer, which later decompose and form objectionable gases.

Location of Street Monuments.

The division of responsibility regarding the location and subdivision of property in cities is responsible for the present unsatisfactory state of the question of location and maintenance of monuments marking land divisions. The survey of property lines is left to the county surveyor, to licensed surveyors or to any one claiming the ability to measure a line and an angle, and the improvement of streets is supervised by the city engineer or employes of a board of public works. Marks set by a surveyor are often retained as private property of the party setting them, and their location is unknown to others unless the information is purchased from or given by him. When the street or sidewalk is improved these marks are destroyed, and in many cases their location can not be reproduced. City engineers are not sufficiently careful of public or semi-public marks, such as section and half-section corners, as they are frequently set or reset by the county surveyor or other authorized person and the notes are not on file or not readily found, and their locations are lost in improving the streets. Even in cities where fairly complete surveys of the city have been made, reference points established and maps placed on file, there are many similar complaints.

While it is probably not desirable to make the city engineer the only authorized surveyor of property lines, his office should be made the repository of all information regarding markings of property lines. In a city with an organization like that of St. Louis, the department of streets would be the proper office to retain this information.

The following procedure is suggested. It will require modification in each special case to suit local conditions. The first essential is a complete survey of the city based on an accurate triangulation, with frequent monuments, recorded in full note books and on detailed maps. This survey should locate all property lines in their actual position and their relation to all original corners that can be certainly located. Whether the monuments shall be located in the street pavement, the curb line, the sidewalks, or on buildings, will depend upon the local conditions. Even if some one method is adopted as a standard, it is probable that all will be used to some extent. These marks, being made by the city engineer and under his supervision, will be preserved by him and can easily be replaced if lost. Many of the marks will be on buildings and sidewalks where improvements or rebuilding will displace them. For this reason an application for a building permit for the repair or replacing of any permanent brick,

stone or steel structure should be referred to the city engineer, if he does not actually issue the permit, that he may transfer any monument which would be affected by the work. Every plat of a subdivision made should be referred to the city engineer for his approval of the monuments set and his location of the same and connection with the city survey before it is filed for record. Such plats should also be passed upon as to their general plan by the engineer or board of public works. A standard form and location of monument should be required, subject to such modifications on account of local conditions as the city engineer may approve. No survey of a lot line should have legal force until full description is filed with the city engineer, with location of any monuments that may have been set, and it has been approved by that department. All information regarding comers will thus be easily obtainable by any one interested, and the city engineer will know where the marks are and how to preserve them during improvements.

Sewage Disposal at Champaign. Inexpensive tanks for a partial sedimentation of sewage have been in use for some time at Urbana, Ill., and seem to be fairly satisfactory. No chemicals are used, simply tanks of sufficient width and depth producing a reduction in the velocity of flow of sewage of one-twentieth to one fiftieth that in the sewer, and surface partitions at intervals which extend eighteen to twenty-four inches below the surface to stop floating matters. The tanks are tightly covered to keep out light and air, and produce very slight odors. The sludge is removed by pumping it into tight wagons and carrying it to a place where it can be run on the surface of a field to dry and be plowed in as a fertilizer. This tank takes care of the sewage from perhaps 2,500 people. The effluent causes little or no complaint except during the three or four months when the water-course into which it discharges is dry.

The neighboring city of Champaign is so well satisfied that it constructs two tanks in parallel, each eight feet wide, forty feet long and five feet depth of water, which are expected to take care of 500,000 gallons of sewage a day. The sludge will be removed five or six times a year or more when necessary. Urbana now pays $5 for cleaning its tanks, each time.

A close approximation to a clean effluent is not claimed, and when the amount of sewage increases, and the water-course becomes saturated with sewage matter, it will be necessary to improve the quality of the sedimentation or extend the purification works. It is proposed ultimately to prepare sand filtration beds for the effluent from the tanks, but it may be several years before this is necessary. The methods used are certainly inexpensive, and as practical approximations to good conditions and adaptability to ex-

isting circumstances are to be commended. An objectionable feature is the gradual saturation of the water-course, its bed, banks and stream with sewage, so that when it does become a nuisance it will be difficult to abate it.

There are so many towns in the prairie and other level states which must resort to some method of sewage treatment, most of the methods are so costly, and so few city officials know the results of carelessness in determining the manner of discharging sewage, that these inexpensive methods of treatment, if properly designed for future extension, according to a definite plan, can be used with considerable advantage, where anything more expensive would not be adopted, leaving future boards to put in the extensions when they become necessary.

Brooklyn Water Supply.

The officials of the water department of the city of Brooklyn have made great efforts during the last few years to secure additional water supply, but have not succeeded. The new administration of Greater New York seems to be fully aware of the needs of Brooklyn, and to be preparing for an early consideration of the problem. The more ample powers of the new corporation seem to be sufficient to raise the necessary funds. Chief Engineer Birdsal is said to be of the opinion that a supply of 300,000,000 gallons a day can be secured from Long Island. The present supply is 85,000,000 gallons. This can be doubled for $15,000,000 and the remainder of the possible supply at less average cost. Included in the amount is $3,000,000 for protection of the water from pollution, which he proposes to do largely as old New York has done, by purchasing what land is necessary.

Long Island City and the rest of the borough in which it is situated is in condition similar to that of Brooklyn. It is probable that Staten Island must go to New Jersey for sufficient water supply.

CURRENT INFORMATION.

SPECIAL ASSESSMENT PLAN FOR PUBLIC WORK IN ST. LOUIS.

It is understood that Mayor Ziegenheim and the city administration of St. Louis, Mo., propose to stand upon the street and sewer improvement amendments to the city charter, as embraced in the Carroll bill, known as amendment No. 3. The bill provides that the entire cost of opening, grading, improving, constructing, maintaining, cleaning and sprinkling boulevards shall be levied, assessed and collected as a special tax on the property frontage or bordering on such boulevards in the proportion that the linear feet of each lot fronting or bordering on the boulevard bears to the total number of linear feet of all property so situated; for the contracting by the board for maintenance, repairing, cleaning and sprinkling, either annually or for a term of years; that the Municipal Assembly shall not grant any franchise for the occupancy or use of such a boulevard, or any part thereof, except with the consent in writing of two-thirds of the owners of property fronting thereon. Special taxes for street, avenue and public highway improvements are to be levied and assessed in the following manner:

The total cost of grading and preparing the

roadbed for the superstructure, placing foundation, curbing, guttering and roadway paving and cross-walks, shall be ascertained, and one-fourth of the same levied and assessed upon all property fronting upon or adjoining the improvement already referred to. The remaining three-fourths shall be levied and assessed proportionately against all the property in the district.

One of the strongest points of the amendment is the establishment of districts and distribution of the cost of improvements among all who benefit by them, which is as follows:

A line shall be drawn midway between the street to be improved and the next parallel or converging street, on each side, which line shall be the boundary of the district, except as hereinbefore provided, namely: If the block be triangular, the midway line shall be located by connecting the middle points of the sides other than that of the street to be improved; if the property adjoining the street to be improved is divided into lots, the district line shall be so drawn as to include the entire depth of all lots fronting on the streets to be improved, and shall not include any portion of any lot having its sole frontage on the parallel or converging street, but if the converging street intersect the street to be improved this exclusion shall not apply to lots on the block or blocks in which the intersection occurs.

If the line drawn midway, as above, would divide any lot lengthwise or approximately lengthwise, and the average distance from the midway line so drawn to the nearer boundary of the lot is less than 25 feet, the district line shall, in such cases, diverge to and follow the said nearer boundary line. If there is no parallel or corresponding street on either side of the street to be improved, the district lines shall be drawn 300 feet from and parallel to the street to be improved; but if there be a parallel or converging street on one side of the street to be improved to fix and locate the district line, then the district line on the other side shall be drawn parallel to the street to be improved, and at the average distance of the opposite district line so fixed and located. Whenever property included is not liable to assesment, the city is to pay the proportion. All the property in the lots, blocks or tracts lying between the streets to be improved and the district lines thus established shall constitute the district. The boundaries of the district are to be described in the ordinance providing for the improvement.

A proportionate sum is to be assessed against each property-owner for all sidewalks; the cost of the improvement of alleys is to be levied and assessed as a special tax upon all lots on the block in proportion to the area of all the lots on such block; the cost of construction or reconstruction in all city improvements is duly apportioned, the city being required to pay for regrading, lighting and repairs. It provides for a new sewer system, to be divided into four classes—public, district, joint district and private.

Public sewers are to be paid for wholly out of the general revenue.

District sewers are those constructed or acquired under authority of ordinance within an established sewer district and paid for by special tax assessed upon all property in this district.

Joint district sewers are those constructed, or acquired, under ordinances uniting one or more districts or unorganized territory for the purpose of providing main outlet or intercepting sewers and paid for by special taxes upon all property on such joint sewer district.

Private sewers are those built with or without permits and paid for by private citizens or associations.

The most important provision of the amendment is that of making special tax bills payable in installments. Under it all special tax bills for the construction or reconstruction of streets, avenues, highways, boulevards or district sewers are to be divided into six equal parts, payable and collectable in installments, the first to be paid within thirty days without interest, the others at the end of each successive year from the date of issue of the tax bills, with interest at 6 per cent. per annum, but any owner so desiring may pay up in full at any time and save further interest charges; when any installment of interest thereon is not met, all remaining installments become due and collectible together, with the interest at the rate of 10 per cent., from date of issue. Suits may be brought in the manner provided by law and the tax bills remain a lien on the property charged therewith. Special tax bills and liens thereof are assignable.

INFLUENCE OF WIDTH OF TIRE ON ROADS.

A bulletin has been issued by the agricultural experiment station of the University of Missouri on the subject of the influence of width of tire on draft of wagons. A summary of results is given by the director, H. J. Waters, as follows:

Numerous tests of the draft of wide and narrow tired wagons have been made at this station during the past two years, on macadam, gravel and dirt roads in all conditions.

and on meadows, pastures and plowed fields both wet and dry. The draft has been determined by means of a self-recording dynamometer. The net load was in every trial the same, viz., 2,000 pounds. Contrary to public expectation, in a large majority of cases the draft was materially less when tires six inches in width were used than when the tests were made with tires of standard width—one and one-half inches. The following is a summary of the results:

1. On macadam street, as an average of the two trials made a load of 2,518 pounds could have been hauled on the broad tires with the same draft that a load of 2,000 pounds required on the narrow tires.

2. Gravel road. In all conditions of the gravel road, except wet and sloppy on top, the draft of the broad tired wagon was very much less than that of the narrow tired wagon. Averaging the six trials, a load of 2,482 pounds could be hauled on the broad tires with the same draft required for a load of 2,000 pounds on the narrow tires.

3. Dirt roads. (a) When dry, hard, and free from ruts and dust, 2,530 pounds could have been hauled on the broad tires with the same draft required for 2,000 pounds on the narrow tires. (b) When the surface was covered with two or three inches of very dry, loose dust, the results were unfavorable to the broad tire. The dust on the road in each of these trials was unusually deep. (c) On clay road, muddy and sticky on the surface and firm underneath, the results were uniformly unfavorable to the broad tires. (d) On clay road, with mud deep, and drying on top, or dry on top and spongy underneath, a large number of tests showed uniformly favorable to the broad tire. The difference amounted to from 52 to 61 per cent., or about 3,200 pounds could have been hauled on the broad tires with the same draft required to draw 2,000 pounds on the narrow tires. In this condition of road the broad tires show to their greatest advantage. As the road dries and becomes firmer the difference between the draft of the broad and narrow tires gradually diminishes until it reaches about 25 to 30 per cent. on dry, hard, smooth dirt, gravel or macadam road, in favor of the broad tire. On the other hand, as the mud becomes softer and deeper, the difference between the draft of the two types of wagons rapidly diminishes until the condition is reached when the mud adheres to both sets of wheels; here the advantage of the broad tires ceases entirely, and the narrow tires pull materially lighter. (e) Clay road, surface dry, with deep ruts cut by the narrow tires in the ordinary use of the road. In every trial the first run of the broad tire over the narrow tire ruts has shown a materially increased draft when compared with that of the narrow tire run in its own rut. The second run of the broad tires in the same track where the rut is not deep completely eliminated this disadvantage, and showed a lighter draft for the broad tire than the narrow tire showed in the first run. Where the ruts were eight inches deep with rigid walls, three runs of the broad tire in its own track over the ruts were required to eliminate the disadvantage. Three runs of the broad tire over this track have in all cases been sufficient, however, to so improve the road surface that both the broad and narrow tired wagons passed over this road with less draft than the narrow tires did in the original ruts. In addition to the saving of draft, the road was made very much more comfortable and pleasant for the users of light vehicles and pleasure carriages by the few runs of the six inch tire. Summing up all the tests on dirt roads, it appears that there are but three conditions on which the broad tires draw heavier than the narrow tires, viz.: (1) When the road is sloppy, muddy or sticky on the surface and firm or hard underneath; (2) when the surface is covered with a very deep loose dust and hard underneath; (3) when the mud is very deep and so sticky that it adheres to the wheels of both kinds of wagons. It appears that the dust must be extraordinarily deep to show a higher draft for the broad than for the narrow tires. The three conditions just named, therefore, are somewhat unusual and of comparatively short duration. Through a majority of days in the year and at times when the dirt roads are most used and when their use is most imperative, the broad-tired wagons pull materially lighter than the narrow-tired wagons

4. A large number of tests on meadows, pastures, stubble land, corn ground and plowed ground in every condition, from dry, hard and firm to very wet and soft, show without a single exception a large difference in draft in favor of the broad tires. This difference ranged from 17 to 120 per cent.

5. It appears that six inches is the best width of tire for a combination farm and road wagon, and that both axles should be the same length so that the front and hind wheels will run in the same track.

In discussing the experiments Mr. Waters estimated that the public roads of the United States aggregate 1,500,000 miles in length. The wagon transportation in the United States is estimated at 500,000,000 tons.

The average distance of haul is placed at eight miles, and the average cost of transporting one ton this distance is assumed to be $2, making the total yearly cost for wagon freighting $1,000,000,000. It is claimed that this freight could be transported the distance of eight miles over first-class roads at an average cost of 80 cents per ton. On this basis a saving of $600,000,000 a year in the cost of wagon transportation could be effected with first-class roads in all sections of the country. The magnitude of this saving will be better appreciated when it is realized that it amounts to about one-fourth of the value, on the farm, of all the farm products of the United States.

In round numbers the sum of $20,000,000 is paid out each year for the maintenance of our public roads outside of the cities. This estimate does not include the cost of permanent improvements. Thus at the end of the year, after an expenditure of $20,000,000, the roads of the country are no better than they were at the beginning of the year. The taxpayers may go on paying this enormous sum for the maintenance of the public highways

under the present system for an indefinite time without securing improved roads. All improvements must come from expenditures above this amount, from changes in the methods of repairing the highways or from the more careful use of them after they are repaired.

HOW A WATER COMPANY'S CONTRACT RIGHTS MAY BE IMPAIRED.

An opinion was rendered by the United States supreme court Jan. 3 in the case of the Penn Mutual Life Insurance Company and others against the city of Austin, Tex. The city had a contract with a water and light company, but called a special election and issued bonds for the construction of its own water and light plants. The company holding the previous contract applied for an injunction, claiming that the action of the city was in violation of the constitution and the law concerning contracts. The court's decision is based principally upon the fact that the contract made by the city was not in conformity with restrictions of the state constitution, and also that the complaining company did not take prompt steps to protect itself and oppose the action of the city in calling the special election, and by negligence impaired the claim for relief in equity. Many authorities are quoted to show that courts of equity uniformly decline to assist a person who has slept upon his rights and shows no excuse for laches in asserting them; where a court of equity finds that the position of the parties has so changed that equitable relief cannot be afforded without doing injustice or that intervening rights to third parties may be destroyed or seriously impaired, it will not exert its equitable powers for the purpose of saving one from the consequences of his own neglect. The court says:

"In this case the rights of the water company under the contract were acquired long prior to 1890. Before that year the water plant was constructed, and from it the people were receiving water. The violations of the contract relied upon as impairing its obligations originated in 1890. The first step was the ordinance calling for an election to vote upon the issue of $1,400,000 bonds, and this was done openly. From that time until 1895 no legal steps were taken to prevent completion of the wrong which the bill alleges. It is presumed that municipal bonds have been disposed of, and this involves the rights of a third party. It is certain that if the completion of the new water works be restrained by injunction the interests of the bondholders will be seriously affected, and this would be brought about by a decree of a court of equity, rendered in the enforcement of asserted rights of complainants who by timely action could have protected themselves."

POWERS OF NEW YORK'S WATER COMMISSIONER.

The commissioner of water supply, William Titon of New York City, is, under the new charter, endowed with powers far in excess of those exercised by any of the officials under the old regime. Section 472 provides that, with the approval of the board of public improvements, of which he will be a member, he "shall have power throughout the State of New York to select and determine all sources of water supply that may be needed for the supply of the public water works" of the city and for the supply and distribution of water therein; any sources of water selected and determined by the commissioner of water supply "shall be deemed necessary for the public use of the city of New York," and, with the approval of the board of public improvements, and of the board of estimate, with the concurrent action of the municipal assembly, the water rights are to be acquired, the real estate necessary is to be condemned, conduits and pipes are to be laid, and other needed work is to be done. He is forbidden to interfere with water used for supplying any other city, town or village of the state, and is not allowed to take water from any of the canals of the state, or from streams used for supplying the canals. He is also authorized to examine the sources of supply of any private company supplying any part of the city, to see that the water is wholesome and the supply adequate. Heretofore the aqueduct commissioners have had no power to go outside of the Croton watershed, even to make surveys. The commissioner is positively restricted, however, in his power to enter into any contract whatever with any person or corporation engaged in the business of selling or supplying water for private or public use without the assent of the board of public improvements after submitting to it the proposed contract in all its details.

PLANS FOR SEWERAGE AT THE NATIONAL CAPITAL.

At a meeting of the Board of Trade at Washington, D. C., Jan. 6, reports were received from the committees on taxation and assessment and on sewerage. The existing sewerage system of the district and the improvements that are contemplated by the system of intercepting sewers that have been recommended by the board of sanitary engineers was explained by Captain Lansing Beach of the engineering department of the District. Captain Beach said that the plan recommended by the board of sanitary engineers for intercepting sewers will be am-

ple for the purposes of the city for fifty years, this estimate being on the supposed increase of population, and, if proper filtration beds are established at the place where the sewerage is emptied or other means taken to purify the sewerage before it is thrown into the Potomac, there is no reason why this system of sewage disposal should not fill all the necessities of this city for one hundred and fifty years instead of fifty years.

Albert M. Read, chairman of the committee on sewerage, stated that the commissioners of the District are about to ask congress to authorize the issue of $3,500,000 worth of 3 per cent. sewage disposal bonds, redeemable at the pleasure of the treasurer of the United States after ten years and payable in forty years from date. The sale of the bonds is to be made as money is required to carry on the work of construction. The commissioners estimate that the sum of $800,000 will be sufficient for the first year's operations, and if this is adhered to that amount of bonds will be issued at the inception of the work, and the balance of them from time to time as need requires. The report of the committee was adopted.

ST. LOUIS OFFICIALS WILL VISIT EASTERN CITIES.

A Good Streets Commission was appointed by the Municipal Assembly at St. Louis, Mo., to make a tour of the eastern cities for the purpose of gathering information for use in the betterment of that city's streets. Robert E. McMath is chairman, Councilman Uthoff treasurer and Delegate Schaefer temporary secretary of the commission.

A PLAN FOR SEWER RENTALS IN BOSTON.

In his recent inaugural address Mayor Josiah Quincy of Boston, Mass., said that it is probable that a plan of sewer rental will be adopted, as follows:

First—All maintenance expenses will be assessed at a uniform rate throughout the city, the charges upon estates being directly proportioned to the last annual water bills paid for such estates; that is, the principle will be recognized that the function of sewers is to carry off water, and that the use of sewers can therefore be fairly and justly measured by the amount of water escaping into them. Doubtless it will be necessary to make some slight exceptions in the application of this rule to cover cases of estates taking water from the city, but unable to drain into any sewer, or of large users of water who dispose of their waste water otherwise than by running it into the sewers. These exceptions, however, will be comparatively slight, and I believe that this basis of assessments for maintenance will prove more just and satisfactory than any other which could be devised.

Second—Comes the problem of assessing the charges for the construction of new sewerage works; this is a somewhat more difficult one, yet I believe it can be satisfactorily and equitably solved. The cases seem to divide themselves into three classes. First—There are the cases where a new sewer is constructed for the exclusive use of abutting estates; in these cases the whole amount of the interest and sinking fund requirements will doubtless be assessed wholly upon the abutting estates, substantially as under the present system, but the annual amounts being smaller. Second—There are the cases where a sewerage work benefits not only the abutting estates but a certain territorial district, which drains through or into the new work; in these cases it is expected that the exact boundaries of the district benefited will be laid out on a plan by the sewer division, and that a special assessment for the interest and sinking fund requirements on the cost of such work will be laid by the board of street commissioners, upon some fixed basis, such as frontage, area or valuation, on all of the estates within such sewerage district. Third—There are the cases where the new works are of a general character, such as trunk sewers, etc.; in these cases it seems equitable to assess upon the local district which drains through or into such new sewer such portion of the total cost as would represent the cost of constructing a similar work for local use solely, leaving the excess of the cost above such sum to be met out of the general tax levy of the city, as at present.

An investigation of the methods of sewer construction, sewer rentals, etc., was made recently by Street Commissioners Duane and Quinn and Chief Surveyor Morrison, a partial report of which was given in the December, 1897, issue of Municipal Engineering.

NEWLY APPOINTED OFFICIALS IN NEW YORK.

Mayor Robert A. Van Wyck, who, Jan. 1, began his duties as mayor of New York City, and as the first mayor of the consolidated city, has made, among many others, the following appointments:

Board of Public Improvements—Maurice F. Holahan, president; William Dalton, commissioner of water supply; James P. Keating, commissioner of highways; James McCartney, commissioner of street cleaning; James Kane, commissioner of sewers; Henry S. Kearny, commissioner of public buildings, lighting and supplies; John L. Shea, commissioner of bridges. Department of Parks—George C. Clarsen, president and commissioner in boroughs of Manhattan and Richmond; George V. Brower, commissioner in boroughs of Brooklyn and Queens, and August Moebus, commissioner in borough of the Bronx. Department of Buildings—Thomas J. Brady, president and commissioner in boroughs of Manhattan and the Bronx; Daniel Ryan, commissioner in

borough of Brooklyn, and Daniel Campbell, commissioner in boroughs of Richmond and Queens. John J. Scannell, fire commissioner. Commissioners of Docks and Ferries—J. Sergeant Cram, Peter F. Meyer and Charles F. Murphy. Civil Service Commissioners—Charles H. Knox, Robert E. Deyo and William N. Dyckman.

THE LYONS (IA.) PAVING CASE.

The Supreme Court decision in the Lyons, Ia., paving case, as given in the January issue of Municipal Engineering, is misleading as to the actual finding of the court. The work was not declared illegal because "bids were advertised for the previous year, while the work was not done until the year following," but because the "notice to contractors" failed to state at what time the bids would be acted on and when the work should be done. The trouble in this case arose from not following the exact provisions of the state law, and more thoroughly emphasizes the fact that city councils must be very careful in drawing up the legal papers in connection with public work. The full text of the decision had not been given out for publication at the time that Municipal Engineering was issued, and the article relating to it was obtained from the first brief press reports that were sent out, which did not give the decision in full.

WATER COMPANIES MUST SUPPLY PURE WATER.

A decision in the equity suit of Brace Bros. vs. the Pennsylvania Water Company, by Judge J. W. F. White at Pittsburg, Pa., decrees that water companies, under the act under which they are incorporated, are bound to furnish pure water to their customers. The court's findings were to the effect that the water furnished during 1896 was not pure, but at times was impure from mud and other sediments, especially during high water in the Allegheny river, from where the water was taken. During the year 1896 the plaintiffs experienced considerable trouble in consequence of the mud and sediment in the water, and had to wash out their filter nearly every day, and sometimes twice a day, thereby using large quantities of water, which was charged to them by the thousand gallons, as indicated by the meter. When the quarterly bills were presented the plaintiffs claimed a rebate or reduction for the quantity of water used in cleaning the filter, which the company refused to pay. A filter was constructed in the river at the inlet pipe in January, 1897, by the company, and during the year the water furnished has been as reasonably pure as water from a river supply can be expected. The court finds that under the evidence a fair and reasonable allowance would be $150, and that they are not entitled to anything for 1897. In conclusion the court says:

"The acts of assembly in reference to chartered water companies require them to supply their customers with pure water. Water containing deleterious substances, injurious to health, is not pure, although it may be perfectly clear. The word pure in this act is not limited to water injurious to health. The word is to be understood in a broader sense in the common and ordinary use of the word. No one would say that very muddy water is pure water. It might be so muddy as to be unfit for drinking or family use. The acts are to be interpreted in a reasonable sense. No water, except distilled water, is absolutely pure. The chartered companies are only required to furnish water that is commonly recognized as pure water, free from injurious substances and reasonably clear. If by a reasonable expense they can filter the water when the river is high and muddy they should do so. The defendant company has shown this can be done."

LIABILITY OF A STREET RAILWAY COMPANY FOR PAVING ASSESSMENTS.

The appellate division of the New York supreme court handed down a decision recently in the case of John Conway vs. the city of Rochester, N. Y. When the council authorized the Lyell-ave. paving the Rochester Street Railway Company was not assessed for any of the cost. Suit was brought and a special injunction secured against the city by John Conway, a tax-payer, to prevent the laying of the pavement until there was a reapportionment of the assessment so as to include the street railway company. Justice Green of the Appellate Division holds that there is no authority whatever in the city charter for assessing any portion of the paving upon the railway company; that the language of the charter, "lots and parcels of land" upon which assessments are authorized to be made, do not cover the tracks, franchises and appurtenances of the railway company; that the general railway law does not authorize the city to impose any portion of the expense of new pavements upon the railway company, but that the duty of the railway company is limited to permanent repairs; that upon the refusal of the company to make these repairs the city may make them and recover the expense from the company.

A NEW HIGHWAY BILL IN NEW YORK.

A good roads bill was introduced in the Senate, Jan. 13, at Albany, N. Y., which provides for the construction through each of

the counties of the state of a macadamized highway that shall follow the leading market and travel routes. The only expense to the counties will be the preparation of a detailed survey of the highways selected, as the entire expense is to be borne by the state and the work is to be done under the direction of the state engineer.

A DECISION AFFECTING PAVING IN IOWA.

In the cases of J. H. Smith and Grace Church vs. the city of Cedar Rapids, Ia., Judge Remley decided in favor of the city Jan. 11. An ordinance was passed by the city council June 3, 1892, to pave certain streets with vitrified brick, of the best quality, and curbing with the best quality of cement. When the bids for the paving were published, to be received March 23, 1894, they specified the best Des Moines or Galesburg paving brick, and referred to the plans and specifications and profiles for particulars, which were on file in the office of the board of public works, and reserving the right to reject any or all bids. The plaintiffs contend that the order and notice do not comply with the law, in that it does not give the city jurisdiction to make the contract for paving because the order does not specify the kind of material to be used definitely; that the notice does not state definitely when the bids were to be acted upon, when the work was to be done, and that it recited that any or all bids might be rejected instead of that the lowest bid would be accepted; that the paving was not done in accordance with the notice and contract, and that the city had no jurisdiction to make said assessments and that the same are illegal and void.

The court's findings are that the order complied with the law and gave the city jurisdiction to make and prosecute said work; that the city had full jurisdiction to make said assessments, which are legal and valid. Judge Remley dissolves the injunction and dismisses the petition.

CONVENTION OF THE WATER WORKS SUPERINTENDENTS.

A convention of water works superintendents, boards and officials will be held in Columbus, O., Feb. 7, for the purpose of organizing a society in Ohio, for the benefit, education and improvement of its members in all things pertaining to the management and maintenance of water works. Efforts will be made to perfect a permanent organization, adopt constitution and by-laws and elect officers for the ensuing year. All manufacturers and dealers in water works supplies, meters, pumps, pipes, machinery and appliances are invited to be present with a display of their goods. Those persons contemplating attendance are requested to communicate with C. W. Wiles, superintendent water works, Delaware, O. For information regarding hotel rates, etc., address J. O'Shaughnessy, superintendent water works, Columbus, O. Headquarters and assembly room will be at the Great Southern Hotel, Columbus, O.

HEAVY DAMAGES AWARDED AN ENGINEER.

A verdict of $20,000 damages has been awarded Lewis B. Jackson, M. Am. Soc. C. E., formerly city engineer of Chicago, Ill., in his suit for libel against Alexander Prussing, secretary of the Wecklar-Prussing Brick Company. The complaint against Mr. Prussing is said to have consisted in his having published a statement, in March, 1896, alleging that Mr. Jackson was using his influence to further the advancement of a proposed ordinance prohibiting the use of brick in sewer building and providing for the substitution of concrete; also, that it was further alleged that a fund of $100,000 had been raised to secure the passage of the bill, and that the city engineer would be duly remembered in the distribution of the money. A new trial will be asked for by the defendant.

THE AVERILL-BARBER SUIT.

The appellate division of the supreme court of the state of New York handed down on Dec. 30, 1897, a decision or judgment against A. L. Barber in a sum of about one-half million dollars on account of estimated profits in laying asphalt pavements in the city of Buffalo, N. Y., where contracts were formerly taken in his name. This is a suit of W. W. Averill as stockholder in a former company, the American Asphalt company, and which company, through a receiver, is calling for an accounting for alleged profits or possible profits due to a patent bearing Averill's name, but in fact against alleged infringements on the patent. A final decision, if ever reached, would mean a distribution of some money to the stockholders of the American company. Col. Worthington, one of Mr. Barber's attorneys, makes the following statement regarding the case:

"After the organization of the Barber Asphalt paving company in 1883 all the asphalt pavements laid by it in the United States were laid under contracts with the company itself, except in the city of Buffalo, where for several years the contracts, although made for the benefit of and ex-

ecuted by the Barber company, were made in the name of Amzi L. Barber. The suit in which the appellate division of the supreme court of New York handed down a decision on the 3d instant was brought by General Averill as a stockholder in the American Asphalt Paving company.

"The judgment of the appellate division is not final. An appeal will be taken by Mr. Barber to the court of appeals of the state of New York, which court has the power to review all the principal questions in the case. And if the court of appeals should affirm the judgment of the appellate division, the case may then be taken to the Supreme Court of the United States upon the question of the jurisdiction of the state courts—it being contended by the defendants' counsel that the suit is substantially a suit for the infringement of a patent, of which the federal courts alone have jurisdiction. The intimations that have been made that the Barber Asphalt Paving company is now liable to suit for the profits made by it in laying pavements in various cities are without the slightest foundation. The supreme court of New York in special term long ago held that neither Averill nor the American company had any claim whatever against the Barber company That judgment on appeal was affirmed by the court in general term in New York City. No further appeal was taken, and the judgment in favor of the Barber company became final. Nor can any further suit be brought against Mr. Barber, because all claims of the American company were involved in the pending suit, and have been decided in his favor, except as to profits alleged to have been made by him on Buffalo pavements during the years when the contracts were taken in his name."

TO PROTECT ASPHALTED STREETS.

The street and water board of Jersey City has introduced four important ordinances. One is to protect the asphalt pavements of the Mercer street driveway from being destroyed by heavy vehicles. It regulates the sizes of the tires of the wagons driven over the drive. A wagon which with load weighs two thousand pounds, must have tires at least three inches wide, and for each additional one thousand pounds an inch must be added, until ten thousand pounds is reached, the maximum weight, with tires eleven inches wide. This will practically exclude heavy wagons from the drive. Ordinances were introduced regulating the driving of wagons and riding of bicycles, and the maximum speed was fixed at seven miles an hour, and another prohibits the carrying on bicycles of children under five years old.

THE BITUMINOUS DEPOSIT NEAR HIGGINSVILLE, MO.

In reply to an inquiry regarding the discovery of a bituminous depost on the grounds of the Confederate Home, near Higginsville, Mo., a letter has been received by Municipal Engineering from Mr. T. M. Lake, of the board of managers, as follows: "It is evidently asphalt in a sandstone formation, but of what per cent. of asphalt I am not prepared to inform you. The rock crops out in a ravine on the premises of considerable thickness, and, although having been exposed to the atmosphere for possibly centuries, appears to be thoroughly saturated with a black oil substance resembling gas tar or petroleum. I have understood that by experts it is pronounced asphalt. Three or four parties or companies are proposing to lease the grounds. The Home management are not disposed to act precipitately in making a lease or any disposition of it blindly."

CHARITY AND STREET CLEANING IN BALTIMORE.

The Charity Organization Society of Baltimore, Md., has made arrangements with A. W. Bostwick, commissioner of street cleaning in that city, to inaugurate a plan whereby men who apply to the organization for aid are to be given work among the street cleaning forces of the city and paid by the organization. The applicant for aid is given a printed slip, on which his name is written, containing instructions to Commissioner Bostwick, and signed by one of the organization's district superintendents. This slip is approved by the commissioner and the bearer is assigned to the district in which he lives and given one day's work. The following day he receives a voucher which is good for the money at the charity organization. The slips have been distributed to the organization's representatives throughout the city, the signature of any one of whom Commissioner Bostwick honors. A daily timebook, furnished by the charity organization, is kept in the office of the commissioner, in which is kept a record of the applicants for work, the districts to which they are assigned and the work done. Men without homes who apply to the organization are also given a chance to get a day's work.

FAVORABLE TO MUNICIPAL OWNERSHIP.

A decision favorable to municipal ownership was rendered by Judge Holmes, Jan. 8, at Des Moines, Ia. Suit was brought by Conrad Youngerman to enjoin the collecting of the 2-mill tax on the taxable property of the city of Des Moines for either purchasing the present water plant or building a municipal plant. The suit was based on the contention that the special tax could not be levied before a contract had been entered into for the use to be made of it. The court holds that the power to levy the tax and to make the con-

tract are conferred in separate sections and are not interdependent. Other objections were raised based on alleged violations of the constitution, but the court rules that these objections were all disposed of, as they were based upon the same proposition, namely: that until a contract has been entered into, the object of the levy of the tax is not public or governmental. "I think it is," decides the court.

THEY GET A BRIDGE WITHOUT PAYING FOR IT.

The Indiana Appellate court affirmed, Jan. 5, the decision of the Marion circuit court in the case of the Wrought Iron Bridge Company against the boards of commissioners of Hendricks and Morgan counties. The company, under contract with the boards of commissioners, erected a bridge across White Lick creek at the County Line ford. Suit for the cost of the bridge was brought against the counties. The court holds that, since the preliminary acts necessary to give the commission authority to make the contract had not been done, the counties are not bound by the contract. In answer to the contention that the counties should pay the value of the bridge because the people have used it ever since its completion, the court holds that counties cannot be made indirectly liable for what is furnished by a contract, in which a statute is wholly ignored, and that persons dealing with municipalities are bound to see that the provisions of the law are followed in making contracts with them.

SMOOTH PAVEMENTS FOR ALLEYS.

The paving and repaving of all alleys with the best kind of smooth pavement is recommended by Dr. J. Tyler Smith, assistant health commissioner, Baltimore, Md., as the most important means of protection to public health. He contends that from a standpoint of health, no city can maintain proper sanitary conditions so long as the cobblestone is used as an article of paving in the alleys and narrow streets; that just so long as such imperfect paving is used the city will have filthy alleys full of holes and ruts, continually ready for the absorption of impurities, and for the growth and multiplication of germs of disease. In a recent personal letter to Mayor Malster, Dr. Smith requested him to recommend in his annual message to the city council that all alleys and lanes throughout the city be paved with a smooth material, saying:

"Alleys and lanes into which drain the waste water, etc., from kitchens, and into which is carried the garbage from the yards, should have smooth and durable paving, so that the natural process of cleaning may be as perfect as possible by the storm-water washing everything into the sewer. It is more important to have the alleys in the rear of our houses paved with a smooth material than the large streets and thoroughfares on which our houses front."

COMPROMISE OF ASPHALT LITIGATION AT PEORIA.

A compromise was made Jan. 18 at Peoria, Ill., in the Perry street paving case, which has been in litigation for the last three years. The Fruin-Bambrick Construction Company offered to deduct $5,000 from the amount of the judgment obtained in the circuit court and the interest allowed on the same in that court, as well as up to date, and to pay court costs. The original cost of the pavement was $55,000, and the city settled for $52,000 and the court costs, which makes a saving of $3,000 to the property-owners.

NEW PUBLICATIONS.

Engineering and Architectural Jurisprudence. By John Cassan Wait, M. C. E., L. B. John Wiley & Sons, New York. Price, $6.00.

Much of the knowledge of law so important to engineers and contractors in connection with their work is supplied in this volume, and this book may well be regarded as a part of their equipment for business. It constitutes a valuable presentation of the law of construction, and its usefulness both to the lawyer and the man concerned on the business side is helped by the fact that the author is able to set forth the law with an accurate knowledge of its technical application. Examples are cited by way of illustration. The work is the outgrowth of special study by one combining special qualifications for bringing to proper focus the view of law, engineering and contracting. It is indexed and cross-referenced in a way that also adds much to its value.

Sewerage and Sewage Disposal. By Henry Robinson, M. Inst. C. E. Spon & Chamberlain, New York. Price, $4.50.

Mr. Robinson in this work undertakes to give a concise summary of the researches of chemists and biologists in relation to water supply, sewerage and sewage disposal, and he has succeeded in reducing to a minimum the labor of investigation on these lines. While devoted largely to sewerage and sewage disposal, the allied subjects of water pollution and purification are given attention. The details embraced in the scope of the work are indicated by some of the chapter headings: Formula for flow in sewers, river pollution, irrigation, ensilage, precip-

itation, sewage sludge, filtration. Many valuable tables are set forth and a diagram on the flow of water in brick culverts is added.

Sanitary House Drainage. By T. E. Coleman. Spon & Chamberlain, New York. Price, $2.00.

To sanitary engineers and architects this is a valuable hand-book, and it has practical interest to the householder, who risks much in neglecting his drainage. It discusses essential sanitary principles and the best practice in house drainage is well shown by illustrations and explanatory sketches.

Paving Brick and Brick Pavements. By H. J. March, assistant engineer Board of Public Works, Buffalo, N. Y.

This is a reprint in pamphlet form of the paper read before the Engineers' Society of Western New York in November, 1896, by Mr. March, to which is added a report of the discussion by the society, and it also includes a number of diagrams and tables illustrating tests of paving brick.

PERSONAL.

Rudolph J. Shirk, superintendent of water works, Lebanon, Pa., has resigned.

A. H. Carner, C. E., resident director of the New York and Bermudez Co., in Venezuela, S. A., is visiting in New York. He will return to Venezuela in the spring.

William B. Melish has been appointed a member of the board of water works commissioners to suceed Dr. Thomas W. Graydon, resigned, at Cincinnati, O.

Hugh J. McGowan, agent of the Barber Asphalt Paving company, Kansas City, Mo., has been promoted to agent for Illinois, Iowa, Kansas and Missouri.

Chas. F. Blake, president of the Oakland Paving Company, died at his home in Berkeley, Cal., Dec. 27, aged seventy-one years.

Edwin C. Brooks has been appointed superintendent of water works at Cambridge, Mass.

Harvy Harris, Bismarck, N. D., has been appointed manager and superintendent of the Bismarck Water Company, to succeed C. B. Little.

Stevenson Towle, M. Am. Soc. C. E., has been appointed consulting engineer to the board of public improvement of Greater New York.

Edward Clapp Shankland, M. Am. Soc. C. E., M. Inst. C. E., Chicago, Ill., has been awarded the Telford medal and premium by the Institution of Civil Engineers of Great Britain for a paper read before the institute Dec. 22, 1896, on "Steel Skeleton Construction in Chicago."

Lyman E. Cooley, who recently resigned his position as consulting engineer to the Sanitary District of Chicago, has sailed for Nicaragua, Central America, to look over the route of the proposed Nicaragua ship canal, in behalf of an American syndicate.

William L. Elseffer, C. E., died in New York City, Jan. 2, aged seventy-one years. Mr. Elseffer was engaged in the development of Central Park, New York City, and in draining the meadows between Jersey City and Newark, N. J.

Arthur J. Cox of the Iowa Engineering Company, Clinton, Ia., who has been traveling through the south, inspecting plans and methods of municipal improvements, will go to Laurel, Miss., Feb. 1, to take charge of a railroad survey for the Laurel & Northwestern Railroad Company.

William G. Cann has been appointed water commissioner for a term of six years, at Savannah, Ga.

Marcellus Strickland, West Chester, Pa., has been elected county engineer of Chester county.

John W. Ross, who resigned his position as a member of the board of commissioners of the District of Columbia, has withdrawn his resignation at the request of the president.

W. K. Park has been engaged as consulting engineer, by the Philadelphia gas works at Philadelphia, Pa. Mr. Park has served for many years as chief of the bureau of gas of the department of public works.

William M. Canby has been reappointed a member of the park commission at Wilmington, Del. George S. Capelle succeeds J. Taylor Gause, resigned, as a member of the commission.

R. B. C. Bement has been re-elected president of the board of water commissioners at St. Paul, Minn. All of the old officers were re-elected, as follows: J. F. Hoyt, vice-president; John Caulfield, secretary; A. R. Starkey, superintendent.

Judge George Hillyer was re-elected president of the board of water commissioners, Jan. 5, at Atlanta, Ga., J. A. Morris was elected vice-president, to succeed Aaron Haas. All old officers were re-elected as follows: Col. Park Woodward, superintendent; Cephas M. Brown, secretary; J. B. Travis and J. A. Gramling, chief engineer.

Duncan MacGregor has been appointed a member of the board of public works, to succeed John G. Stradley, resigned, at Sault Ste Marie, Mich.

Albert S. Crane read a paper on "Filtration of Sewage" before the Brooklyn Engineers' Club, Brooklyn, N. Y., at its regular monthly meeting, Jan. 6.

B. J. T. Jeup, city engineer, Indianapolis, Ind., started Jan. 12 for a visit to New York, Washington, Baltimore, Philadelphia and Buffalo to study the methods of street paving in use in those cities.

Benjamin R. Chapman has been elected city engineer at Brockton, Mass.

Col. August Goebel has resigned his position as a member of the board of water commissioners at Detroit, Mich.

Leroy Ackerly has been appointed superintendent of the Northport Water Works Co., Northport, N. Y.

James Fitch has been appointed deputy commissioner of water supply and John E. Backus deputy commissioner of bridges for the borough of Queens, New York City.

William Brennan has been appointed deputy commissioner of sewers and Henry Beam deputy commissioner of bridges of the borough of Brooklyn, New York City.

Thomas J. Byrne has been appointed deputy commissioner of sewers for the borough of Bronx, New York City.

Charles Fiske has been elected city engineer at Gloversville, N. Y.

A. O. Young has been elected city engineer at West Covington, Ky.

Jos. J. Rocker has been appointed commissioner of the water board at Detroit, Mich.

Samuel J. Lord has been elected city engineer of Manchester, N. H., succeeding Winifred H. Bennett.

A. F. Nagle, M. Am. Soc. C. E., Chicago, Ill., has been engaged as consulting engineer by the Lane & Bodley Co., Cincinnati, O., in the construction of the new 30,000,000 gallon pumping engines for that city.

Edward Seybolt, ex-superintendent of water works, has been elected acting superintendent of public works and Frederick A. Malette chairman of public works at Geneva, N. Y.

Frederick A. McClure has been re-elected city engineer at Worcester, Mass. The other officers are: Harrison P. Eddy, re-elected superintendent of sewers; John G. Brady, water commissioner; Geo. E. Batchelder, water registrar; Wright S. Prior, street commissioner.

Mr. B. F. Stradley of the Vulcanite Portland Cement Co., Philadelphia, visited Chicago, Indianapolis and St. Louis on business early in January. He reports a demand for the entire output of his company.

C. H. Spencer, formerly clerk of the board of park commissioners, has been appointed to succeed Bart Parker as clerk of the board of public works at Indianapolis, Ind.

Robert C. Fenton has been appointed city engineer at Willimantic, Conn.

Frank V. E. Bardol, formerly assistant engineer in the bureau of engineering, Buffalo, N. Y., has been appointed city engineer of that city.

Benjamin R. Chapman has been elected city engineer at Brockton, Mass.

J. C. Whitney has been reappointed water commissioner at Newton, Mass.

J. B. Keckley has been elected superintendent of streets at Charleston, S. C.

Henry D. Woods, M. Am. Soc. C. E., has been reappointed city engineer at Newton, Mass.

Sanford Littleton has been elected chairman of the board of public works at Knoxville, Tenn.

L. T. Hensel has been elected secretary and superintendent of the Quarryville Water Co., Quarryville, Pa.

Henry F. Green has been appointed superintendent of the Littleton Water & Light Co., Littleton, N. H., to succeed N. H. Corning.

Edwin H. Schoff has been elected superintendent of the water works at Lebanon, Pa., to succeed Rudolph J. Shirk.

Edward H. Keating, M. Am. Soc. C. E., has resigned his position as city engineer at Toronto, Canada, to accept that of general manager of the Toronto Railway Co.

The officers of the St. Paul Engineers' Club for 1898 are: President, J. D. Estabrook; vice-president, Oliver Crosby; secretary, C. L. Annan; treasurer, A. O. Powell; librarian, A. W. Hunter.

Emil Kuichling, chief engineer of the water works department, Rochester, N. Y., delivered a lecture Jan. 19 before the Women's Educational and Industrial Union on "The City Water Works."

MUNICIPAL REPORTS.

LITTLE FALLS, N. Y.—A report on street paving was submitted to the board of public works Dec. 24 by Stephen E. Babcock, city engineer. For the purpose of getting exact data Mr. Babcock wrote to the city engineers of Troy, Albany, Amsterdam, Gloversville, Utica, Rochester, Buffalo and Philadelphia, asking for the average prices of asphalt and brick in 1895, 1896 and 1897. Mr. Babcock says that a summation of this data would seem to make the proper and safe estimate of the cost of pavement in Little Falls to be approximated $2.75 per square yard for asphalt and $1.75 per square yard for brick, both with 6 inches of concrete, 1½-inch sand cushion or binder and blocks, or 2 inches of aspnalt and a 10-year guarantee in both cases.

The cost of the telford or macadam pavements laid in Little Falls has been from $0.70 to $1.00 per square yard. The Burwell street roadway let by contract in 1897 cost $1.00 per square yard, while the streets done by days' work have cost from $0.70 to $0.90 per square yard.

He expresses himself as fully satisfied that it is true economy to pave all the business streets with brick, and recommends that enough be done at one time to secure low prices and to put the business streets in proper paved condition within the shortest possible period.

NEWARK, N. J.—A preliminary report of the progress and cost of street improvements during the last year in Newark, N. J., is as follows:

Street Paving.

	Miles.	Sq. Yds.	Cost per Final Est.
Asphalt	1.26	26,697	$ 68,203 77
Brick	.57	12,926	27,740 28
Granite	.89	16,502	33,885 18
Telford	.64	6,032	3,726 65
	3.36	62,157	$133,555 88

Sewer Department.

	Feet.	Miles.	Cost Per Estimates.
Brick	9,305	1.76	$92,251 68
Pipe	18,394	3.48	17,252 64
	27,699	5.24	$109,504 32

INDIANAPOLIS, Ind.—A table has been prepared by B. J. T. Jeup, city engineer, showing that during 1897 there was laid 3.74 miles of asphalt paving at a cost of $185,252, making a total mileage of 35.08 since 1891, at a cost of $2,243,112; brick, 1.01 miles, costing $842,806; gravel streets, 10.17 miles, $133,137, making a total of 44.91 miles. No wooden

block pavements were completed during the year. Of cement sidewalks 21.55 miles were constructed at a cost of $102,217, and less than one-third of a mile of brick sidewalks were laid, costing $461. There were 10.96 miles of sewers built at a cost of $132,490, giving the city a total of 66.23 miles at a cost of $1,200,599. The total cost of all improvements during 1897 was $599,187, and for the period since 1891, $5,812,748. In discussing repairs to permanently improved streets City Engineer Jeup says:

"Referring to the matter of the protection of streets, would recommend to the board of public works to submit to the council two ordinances, one an amendment to the building ordinance, requiring building contractors, erecting buildings on the line of permanently improved streets, to give a bond of from $50 to $300, according to the nature of the building to be erected, to secure the proper repair of the adjacent streets, and another ordinance requiring all oil wagons to have proper drip pans under the draw cock, so as to prevent oil from dripping and injuring the pavement."

The construction of additional drives leading to the recently annexed suburbs, with wide brick gutters, which could be used as bicycle paths, is recommended for the present year. The recommendations for permanent street improvements for the coming year include a large number of unimproved streets running east and west, and, as these streets have light travel, either a 2-inch asphalt surface on a 4-inch concrete base, or long-leafed Southern yellow pine blocks, creosoted, 4 inches thick is recommended. For the other streets either creosoted pine blocks, 4 or 5 inches thick, on a 6-inch concrete base, or asphalt 2 inches thick on a 1 inch binder course and a 6-inch concrete base will be used.

DETROIT, Mich.—The twenty-third annual report of the Detroit board of public works shows that during the last fiscal year over eleven miles of new pavement were laid, and over seven miles of repaving was done. The prices paid were very low, and the board remarks: "In fact, the margins to contractors must have been of the smallest, even if some did not lose money." The board assumes no responsibility for this, but thinks that it should in the future refuse to permit bids from contractors who have caused trouble by their work or who have failed to pay creditors for material. Over two and a half miles of public sewers were constructed at a cost of $58,327, and over twelve miles of lateral sewers were built. The city entered into contracts for repair of its asphalt pavements, amounting to 210,000 square yards, for a period of five years at an average price of about 16 cents per yard per year, the lowest price being that of the Warren-Scharf Co., at 9 cents per yard yearly on its pavements, though it refused to take pavements laid by other companies at this price. The other contracts were at 25 and 20 cents per yard yearly, the former being for what is known as the Robinson pavements.

KANSAS CITY, Mo.—At the request of H. A. Wise, city engineer, Captain J. G. Adams has prepared a statement showing street paving and sidewalks constructed, as follows:

	Sq. yds.	Miles.	Cost.
Asphalt	174,848	7.065	$373,854
Brick	102,476	5.63	143,996
Macadam	87,998	3.676	72,363
Brick walks	*387,864	10.47	34,334
Natural stone walks	* 86,231	2.7	16,000
Artificial stone walks	*186,427	5.23	36,352
Plank walks		1.38	2,124

*Square feet.

A material reduction in the price of asphalt paving is shown, for while it formerly cost from $2.50 to $2.80 a square yard it now costs from $2 to $2.16. The city now has 39.97 miles of asphalt, 23.53 miles of vitrified brick, 17.25 miles of cedar block, 2.12 miles of stone block and 21.61 miles of macadam paving, or a total of 104.48 miles of paved streets out of a total of 253 miles of streets. Nearly $600,000 was expended for paving during the year. The following work was either under contract Dec. 15, 1897, or had passed the preliminary stage:

	Miles.	Cost.
Asphalt	2.39	$83,110
Macadam	1.44	31,417
Brick	1.19	28,662
Total	5.02	$143,189

TECHNICAL AND TRADE MEETINGS.

MONTANA SOCIETY OF CIVIL ENGINEERS.

The tenth annual meeting of the Montana Society of Civil Engineers was held in Butte, Mont., Jan. 6-8. Officers were elected for the ensuing year as follows: President, James M. Page, Twin Bridges; first vice-president, M. S. Parker, Great Falls; second vice-president, Horace J. Smith, Helena; secretary and librarian, Albert S. Hovey, Helena; treasurer and member of the board of mechanical engineers, James S. Keerl, Helena; trustees, F. W. Blackford, Butte; Edward R. McNeil, Boulder; Finlay McRae, Helena.

IOWA ENGINEERING SOCIETY.

The Iowa Engineering Society held its tenth annual convention in Cedar Rapids, Ia., Jan. 19-20. The meeting is said to have been the best ever held. The convention was opened with an address by President C. R. Allen, of Ottumwa, after which the following papers were read: "A Puzzling Problem," Seth Dean; "Street Grades," L. H. Stone: "Street Railways," B. Shreiner; "The County Surveyor as a Map Publisher," J. S. Pingrey; "Laying a Submerged Water Main," E. P. Boynton; "The Centerville Cemetery," Wm. Steyh; "Education as a Means," Prof J. T. Beard; "Iowa Geology, from an Engineering View," Dr. S. Calvin; "Light and Lenses," Prof. W. H. Mahaffie; "Artesian Well as a Source of Water Supply," Prof. W. H. Norton; "The Air Light Pump of the Ft. Madison Water Works," J. Ross Robertson; "The Water Supply of Des Moines," L. Higgins; "Interpretation of Sanitary Water Analysis," Prof. Floyd Davis; "Des Moines Paving Brick and Clays," E. P. Boynton; "Tests of Iowa Building Stones and Paving Brick," Prof. A. Marston. Officers were elected for the ensuing year as follows: President, C. P. Chase, Clinton, Ia.; vice-president, B. Schreiner, Des Moines, secretary and treasurer, E. P. Boynton, Cedar Rapids; directors, G. Davis, of Cedar Rapids, and J. G. Ratcliff, of Waukon.

ILLINOIS SOCIETY OF ENGINEERS AND SURVEYORS.

The Illinois Society of Engineers and Surveyors held its thirteenth annual meeting in Peoria, Jan. 26, 27 and 28. Among the papers presented were the following: "The Relationship of the Civil Engineer to Farm Drainage," D. J. Stanford; "The Ferozone Polanite Treatment of Sewage at Acton, England," J. W. Alvord; "Chemistry of Water Supply," A. W. Palmer; "Proposed State Supervision of Water Supply and Sewage Disposal," Jacob A. Harmon; "Deep Well Pumping," E. E. Johnson; "Brick for Country Roads," Thomas S. McClanahan; "Brick and Macadam Country Roads," J. Ed Miller; "Improving the Roads of Illinois," J. T. Schmeltzer; "The Improvement of Transportation in Country Districts," E. E. R. Tratman; "City Map Making," M. Huebinger. Among the subjects for discussion were the following: "Land Surveying Problems," "The Status of the Surveyor in Illinois," "Is It a Profession or a Trade?" "What Legislation Is Needed to Have All Landmarks Permanently Established?" "Why Not License Engineers and Surveyors, as Well as Horseshoers, Teachers, Doctors, Lawyers, Etc?" "Sewage Disposal," "The Most Practicable Deep Well Pump for City Water Supply," "What Legislation is Needed to Establish Permanently Improved Highways?" "Are Standard Specifications for Sewer Pipe Practicable?" "Our New Special Assessment Law," "What Is Needed to Establish Grade Crossings at Railroads and Highways?" "The Manufacture of Portland Cement."

Reports of committees were made on licensing surveyors, drainage, municipal engineering, general engineering, water works and water supply, public highways, paving brick specifications and tests, sewer pipe specifications and tests and cost of public works.

NATIONAL BRICK MANUFACTURERS' ASSOCIATION.

The twelfth annual meeting of the National Brick Manufacturers' Association will be held in Pittsburg, Pa., Feb. 15-18. The meeting will be held in the banquet hall of the Monongahela house, and this hotel will be headquarters during the convention. The program will include the following addresses, which will be followed by general discussion:

"Looking Forward," J. C. Adams, Indianapolis, Ind.; "The Use of Electric Tramways in Hauling Clay," Charles W. Elker, Chicago, Ill.; "Burned Clay as a Fire-Proofing Material," W. D. Henry, Pittsburg, Pa.; "The Economy of Brick as Compared with Frame Structures," R. N. Buell, New Britain, Conn.; "Brickyard Construction," Frank W. Butterworth, Marion, Ind.; "Drying Brick in Kiln by Use of Heat from Cooling Kilns," S. H. Alsip, Belleville, Ill.; "Why Some Brickmakers Live in Wood Houses," T. D. Potter, Gardner, Mass.; "Experimental Work, Wise and Otherwise," E. E. Gorton, Terra Cotta, Ill.; "Brickmaking in the Far Northwest," Walter S. Bowen, Little Falls,

Wash.; "Preparation of Clay for Soft Mud Brick," C. L. Merrick, Syracuse, N. Y.; "Brickmakers' Accounts," W. H. Hoagland, Cayuga, Ind.; "The Advancement of Paving Brick Tests," Arthur W. Sewall, Pittsburg, Pa.; "The Refractory Qualities of Clays," Prof. Edward Orton, jr., Columbus, O.; "Manufacture and Use of Press Brick in the South," Lee Dunn, Lake Charles, La.

OHIO SOCIETY OF SURVEYORS AND CIVIL ENGINEERS.

The Ohio Society of Surveyors and Civil Engineers held its nineteenth annual meeting in Columbus, O., Jan. 17, 18 and 19th. Among the papers presented were the following: "Asphalt Pavements," C. H. Snow, Elyria; "Random Notes on the Construction of Brick Pavements," E. A. Kemmler, Columbus; "City Franchises and City Streets—In Small Cities," M. A. Munn, Mansfield. A report of the committee on city engineering was presented by Josiah Kinnear, chairman of the committee, of Columbus.

ILLINOIS CLAY WORKERS' ASSOCIATION.

The Illinois Clay Workers' Association held its annual meeting at Decatur, Ill., Jan. 5 and 6. It was decided that the association should make an exhibit at the state fair. Officers for the ensuing year were elected as follows: President, P. F. Townsend, Avon; vice-president, Henry Amman, Decatur; treasurer, Wm. Stare, Mendota; secretary, G. C. Stoll, Grant Park.

AMERICAN SOCIETY OF CIVIL ENGINEERS.

The American Society of Civil Engineers held its forty-fifth annual meeting in the Society House, New York City, Jan. 19 and 20. The report of the board of directors showed the total membership to be 2,079, a net increase of 58 during the year over the death loss of 17. It was announced by the committee on prizes that the Norman medal had been awarded to Julius Baier, Assoc. M. Am. Soc. C. E., for his paper on "Wind Pressures in the St. Louis Tornado," and the Rowland prize to Arthur L. Adams, M. Am. Soc. C. E., for his paper on the "Austin City Water Works." A motion to discontinue the 24-hour notation on the society's publication was lost, as was also a motion proposing the society's action restricting the use of the title C. E., and opposing the municipal appointment of men not qualified as engineers for the direction of important bridge work. The election of officers resulted as follows: President, Alphonse Fteley, New York City; vice-presidents, E. P. North, New York City, and Frederick P. Stearns, Boston; treasurer, John Thompson, New York City; directors, S. L. F. Deyo, New York City, District No. 1; John Kennedy, Montreal, Quebec, District No. 2; Henry Manley, Boston, Mass., District No. 3; Charles C. Schneider, Pencoyd, Pa., District No. 4, and John J. McVean, Grand Rapids, Mich., and George Y. Wisner, Detroit, Mich., District No. 5.

CANADIAN SOCIETY OF CIVIL ENGINEERS.

The Canadian Society of Civil Engineers held its tenth annual meeting in Montreal Jan. 11. Officers for the ensuing year were elected as follows: President, W. G. McN. Thompson, Welland; vice-presidents, F. W. Blackwell, Montreal; P. W. St. George, Montreal; H. D. Lumsden, C. P. R.; treasurer, A. Irwin, Montreal; secretary, C. A. McLeod, Montreal; librarian, W. McNab, Montreal. Council—H. N. Ruttan, Winnipeg; E. A. Keating, Toronto; C. E. W. Dodwell, Halifax; St. George Boswell, Quebec; Duncan McPherson, Montreal; J. M. Shanly, Montreal; G. H. Duggan, Montreal; H. Peters, St. John, N. B.; C. B. Smith, Montreal; J. D. Barnett, Stratford; T. C. Gamble, Nelson, B. C.; J. Galbraith, Toronto; E. Marceau, Montreal; J. L. N. Coste, Ottawa; W. McLea Walbank, Montreal.

CONNECTICUT CIVIL ENGINEERS' ASSOCIATION.

The Connecticut Civil Engineers' Association held its fourteenth annual meeting at Hartford, Conn., Jan. 13. Officers were elected as follows:

President, Robert A. Cairns of Waterbury; vice-president, L. W. Burt and Edwin D. Graves, both of Hartford; secretary and treasurer, George K. Crandall of New London. Executive Committee—R. A. Cairns, chairman, ex-officio; William G. Smith of Waterbury, William B. Palmer of Bridgeport, C. H. Bunce of Hartford, and L. W. Burt of Hartford. Membership Committee—Charles E. Chandler of Norwich, William H. Olmstead of East Hartford, and William H. Cadwell of New Britain.

The engineering work accomplished in the State during the year was reviewed by President Cairns in his annual address. A map of the streets in Hartford, showing the asphalt work that has been done, the new work proposed, the macadam and dirt streets in the city, etc., was exhibited by City Surveyor C. H. Bunce. A paper was presented by T. H. McKenzie, of Southington, who has

charge of the New Britain water works, concerning the work of construction. J. R. Wilkes, of New Rochelle, N. Y., read a paper on "The Chemical Precipitation Works at New Rochelle."

CINCINNATI ENGINEERS' CLUB.

The Engineers' Club of Cincinnati elected officers, at its annual meeting, as follows: President, G. W. Kittredge; vice-president, W. B. Ruggles; directors, A. O. Elsner, H. E. Warrington and William C. Jewett; secretary and treasurer, J. F. Wilson.

NEW ENGLAND WATER WORKS ASSOCIATION.

The quarterly meeting of the New England Water Works Association was held in Boston Jan. 12. Papers were read and discussed as follows: "The Worcester Distributing Reservoir," by Mr. W. E. Hassam, civil engineer and assistant city engineer of Worcester; "Back Filling Trenches," by E. H. Gowing, civil engineer, Boston; "Handling Air in a Tube Well Pumping Plant," by D. N. Tower, superintendent of water works, Cohasset, Mass.

ENGINEERS' SOCIETY OF WESTERN PENNSYLVANIA.

The Engineers' Society of Western Pennsylvania, at its annual meeting Jan. 18, elected officers as follows: President, G. S. Davidson; vice-president, W. A. Bole; directors, C. F. Scott, Gustave Kaufmann; secretary, R. A. Fessenden. Emil Swenson, the retiring president, delivered an address on "The Economic Function of the Engineering Profession and the Lesson Taught by the Late Business Depression."

ENGINEERS' CLUB OF PHILADELPHIA.

The Engineers' Club of Philadelphia elected officers at its annual meeting, Jan. 15, as follows: President, L. Y. Schermerhorn; vice-president, William C. L. Eglin; secretary, L. F. Rondinella; treasurer, George T. Gwilliam; directors, Richard L. Humphrey, C. H. Ott and Edward F. Smith.

INDIANA ENGINEERING SOCIETY.

The Indiana Engineering Society held its eighteenth annual meeting in Indianapolis Jan. 3, 4, 5 and 6, President A. W. Smith of Kokomo presiding. The addresses delivered during the convention were as follows: "For the Good of the Profession," J. M. Cunningham, surveyor of Sullivan county; "Roads and Road Building," J. F. O'Brien, Cloverdale; "The Business End of Civil Engineering," C. G. H. Goss, Martinsville; "The Municipal Engineer," A. J. Hammond, Frankfort; "Cement," J. W. Dickinson, Chicago; "Bituminous Grout Filler for Brick Pavements," J. H. Vail, Chicago; "Brick vs. Asphalt in Small Cities," H. L. Weber, Richmond; "Minimum Grades for Drain Tiles," William M. Whitten, South Bend; "The Columbia City, Ind., Sewer System," C. G. H. Goss, Martinsville; "City Engineering," H. B. Fatout, Indianapolis; "Engineering Expert Testimony," Prof. R. L. Sackett, Earlham college. An address was also read by H. B. Fatout, which was prepared by Edward Hill of Indianapolis, on the old National road, which contained an historical sketch of the road from the time its construction was begun, in 1806, at Cumberland, Md. The road is 800 miles long and terminates at St. Louis. In the construction of the road the chief undertaking was the erection of an old covered bridge over White river, begun in 1831 and completed in 1833. After the reading of this address the society adopted a resolution asking "the proper authorities to preserve the bridge as a monument of engineering work of pioneer days." The bridge was built by William H. Wernway, a United States engineer, and Walter Blake, and is known as the "Wernway" bridge.

Mr. Vail took the place on the program assigned to the president of the Pennsylvania Tar Mfg. Co. of Chicago, Mr. J. W. Ford, who was unable to be present. Mr. Vail called attention to the use of bituminous grout as a filler for brick, stone or block pavements, which, he said, would prevent moisture from getting underneath the bricks to undermine the foundation and to prevent the bricks from absorbing moisture. It is also of an elastic nature, which provides for contraction and expansion and deadens the noise of traffic. "This filler, he said, "is also of a nature so as not to soften or run in hot weather or cause any annoyance to traffic by sticking to the wheels; neither will it become brittle in cold weather. It is also very tough; sufficient to prevent the edges of the bricks from crumbling and to keep the bricks in place so that they will wear uniformly and smoothly. Jos. Downey, commissioner of public works, Chicago, built a tunnel under the Chicago river at Jackson street and laid the bricks with this material."

This grout has been used for ten years on important masonry work and for coating foundation walls. It has all the qualities of natural asphalt and is more elastic. It does not evaporate and is very tenacious. It can be applied fast and will not delay the work as the street is ready for traffic immediately

after it is applied. The bituminous grout is heated and poured over the pavement while hot and brushed into the joints and is immediately covered with a coating of dry sand, which is absorbed and forms an asphaltic cement over the entire surface of the pavement. The material is furnished to contractors in barrels prepared ready for use or if desired the kettles and men are provided to heat and pour it on the streets and complete the job after the pavements have been put in position and prepared for receiving the filler, conforming in all respects to the city specifications.

The society elected officers as follows: President, J. W. Trotter, Danville; vice-president, A. J. Hammond, Frankfort; secretary and treasurer, J. B. Nelson, Indianapolis; executive committee, C. G. H. Goss of Martinsville, H. B. Fatout of Indianapolis, and A. W. Smith of Kokomo.

SCRANTON ENGINEERS' CLUB.

The Scranton Engineers' Club, Scranton, Pa., elected officers at its annual meeting, Jan. 13, as follows: President, A. D. Blackinton; vice-president, W. M. Marple; recording secretary, H. W. Rowley; treasurer, A. H. Storrs; librarian, A. E. Lister; directors, Jas. Archbald, W. A. May and C. C. Rose.

DENVER SOCIETY OF CIVIL ENGINEERS.

The Denver Society of Civil Engineers, at its annual meeting, Jan. 12, elected officers as follows: President, R. A. Wilson; first vice-president, A. I. Fonda; second vice-president, H. Breen; secretary and treasurer, W. B. Lawson; librarian, F. Cogswell; executive committee, H. Breen, J. W. Nesmith and Walter Pease.

MACHINERY AND TRADE.

THE TRINIDAD ASPHALT COMPANY.

The Trinidad Asphalt company, on Dec. 28, 1897, voted to sell its property and business to the new Trinidad Lake Asphalt Co. The following statement of facts regarding the reorganization is furnished Municipal Engineering by the company:

At a meeting of the stockholders of the Trinidad Asphalt Company held on the 28th of last December, the officers and directors of the company were unanimously authorized and empowered to sell all its property, assets, concessions and franchises to Mr. A. L. Barber and to take the necessary steps to dissolve the corporation. A new company has been organized in London under the English companies act to which Mr. Barber will transfer all the rights which he has acquired. The new company, which is called the New Trinidad Lake Asphalt Co., Ltd., of London, will then succeed to the business of supplying Trinidad Lake asphalt for paving and other purposes throughout the world. The authorized capital of the new company will be one million (£1,000,000) pounds, and will be divided into ordinary shares not exceeding five hundred thousand (£500,00) pounds and 6 per cent. debentures not exceeding five hundred thousand (£500,000) pounds. The stockholders of the Trinidad Asphalt company will receive securities of the new company in exchange for their present shares on the terms agree upon. The property and business of the Trinidad Asphalt company will be taken over by the new company as a going concern. The business in America will be carried on through an office or agency in New York.

This reorganization has been decided upon because the interests of the Trinidad Asphalt company are becoming so extensive in foreign countries that the officers of the company, after mature thought and careful negotiations extending over the entire year just passed, consider that it will be more advantageous to make London the center of its future operations. The additional capital which is secured by the reorganization will be used to extend the business in all parts of the world. Paving companies will be organized in different countries of Europe, and the introduction of Trinidad Pitch Lake asphalt as a paving material in the large cities of the old world will be vigorously pushed.

The Trinidad Asphalt company was organized under the laws of the state of New Jersey on Aug. 15, 1888, with an authorized capital of $2,000,000. In March, 1893, the authorized capital was increased to $3,000,000, and in 1895 the stockholders again authorized an increase in capital to $3,500,000.

The concession to the Pitch Lake, which was the company's most valuable asset, came into operation on Feb. 1, 1888, and the business of the Trinidad Asphalt company was computed from that date, although the actual date of incorporation was Aug. 15 of the same year.

INDIANA CEMENT COMPANIES CUTTING PRICES.

The Western Cement Association, of which eleven of the thirteen cement mills in Clark county, Indiana, are members, cut the price of cement about Jan. 12 5 cents on the barrel, and another cut may follow. The cut is caused, it is asserted, by the cutting of prices by independent companies for several months. The independent companies say that they will meet this and any other cuts that may follow. The price of cement will range from 40 to 60 cents a barrel,

according to where the product is sold, and in localities where it comes in contact with other brands the price will be lower. A company, in which Jacob Weaver is interested, is preparing to erect a mill at Sellersburg, Ind., and another new one will be erected soon on land adjacent to the Black Diamond Mill by Charles Goetz, of St. Louis. These new competitors in the field will help to force the fight.

The Union Lime & Cement company of Louisville is reported as seriously considering the building of a Portland plant at Bedford, Ind.

TESTS OF CHICAGO WATER PIPE.

The Chicago Tribune of December 18th stated that "all water pipe contracted for by the city with the Addyston Company, of Cincinnati, has been rejected, pending an investigation," in addition to which other statements were made regarding the inspection. On similar information from other sources an item in accordance with the above statement was published in the January number of this magazine. We are in receipt of a letter from Mr. A. B. Beers, manager of the Pittsburg Testing Laboratory, Ltd., in which he says that the reports affecting the inspection were malicious in their origin and unfounded, and that "it was an easy matter to prove by affidavits and reliable witnesses that the charges and slanders were fabrications of the most flimsy character." Mr. Beers says that there was no rejection pending inquiry regarding the character of the pipe furnished up to date, except that broken in transportation and handling. The following letters in proof of the falsity of the reports have been received, and in justice to the Pittsburg Testing Laboratory, Ltd., they are given space in full:

Chicago, Dec. 31, 1897.

To the Editor of Municipal Engineering:

Sir—As certain false and malicious rumors intended to injure us have been circulated regarding the efficiency and integrity of the services rendered by us as inspectors of 35,000 tons of cast iron pipe, being made by the Addyston Pipe & Steel Company for the City of Chicago, and wide publicity has been given to the statement that six pieces of 36-inch pipe had been rejected after delivery, we requested the commissioner of public works and the city engineer of Chicago to thoroughly investigate the matter. After such investigation, the city engineer, Mr. John Ericson, has reported to the commissioner of public works, Mr. L. E. McGann, that the Pittsburg Testing Laboratory, Ltd., have performed their duties in a satisfactory manner, and further that there is no cause for the rejection of any pipe previously accepted by their inspectors, except those pieces broken in transit and handling.

We make this statement desiring to correct any false impressions which may have been created by these reports. Your truly,

PITTSBURG TESTING LABORATORY, LIMITED.,
(Signed.) T. L. CONDRON,
Resident Engineer.

The other letter is as follows:

Department of Public Works,
Chicago.
Bureau of Engineering.
Dec. 31, 1897.

T. L. Condron, Resident Engineer, the Pittsburg Testing Laboratory, Limited, Monadnock Block, Chicago:

Dear Sir—In view of the fact that several pieces of pipe furnished to the city of Chicago by the Addyston Pipe & Steel Company under contract, have been rejected as faulty by our local inspector, said pipe having been previously inspected for the city of Chicago by the Pittsburg Testing Laboratory, Limited, I have made a personal examination of the said rejected pipes. I found that all the pipe, except the ones cracked in handling since leaving the testing machine, were acceptable.

The Pittsburg Testing Laboratory, Limited, have performed their duties in a satisfactory manner. Yours truly,

(Signed.) JOHN ERICSON,
City Engineer.

RECENT INVENTIONS.

(Reported specially for MUNICIPAL ENGINEERING, by Arthur M. Hood, Indianapolis, Ind. Copies of any patent may be obtained for 10 cents.)

586,134—Dec. 28, 1897.—Signaling Circuit for Fire and Police Systems—Albert Barrett, Kansas City, Mo.

596,329—Dec. 28, 1897.—Street Sweeper—T. R. Jones, Sacramento, Cal. A truck from which depends, large end down, a conical casing. Within the casing is mounted a fan upon the lower end of the shaft of which is mounted a brush. Leading into the casing above the blower is an air-pipe, which discharges air under pressure and blows the dirt out through another pipe into a dirt receptacle.

596,331—Dec. 28, 1897.—Street Sweeper—W. S. Mears, Scranton, Pa. It is the object of this machine to deposit the dirt in small sacks.

596,531—Jan. 4, 1898.—Sewer—J. C. McGowan, Washington, D. C. The system consists of three sewers or channels. One is open at both ends, which open ends are always in communication with a source of water; the second is a gravity sewer connected, at its upper end, with the first sewer, and the third is a main discharging sewer communicating with the lower end of the gravity sewer.

596,669—Jan. 4, 1898.—Street Sprinkler—W. S. Twining, Philadelphia, Pa. A truck carrying a water tank, to which is flexibly connected a sprinkler pipe, which may be swung about a vertical axis.

596,694—Jan. 4, 1898.—Gutter Cleaner—W. F. Cook, Franmingham, Mass.

597,281—Jan. 11, 1898.—Concrete Bridge—

Adam Geisel, St. Louis, Mo. A bridge in which skewbacks are formed upon the abutments, and voussoirs of lead or asphalt mounted on the skewbacks. The rest of the arch is formed by voussiors of concrete. If desired the keystone may be flanked by voussoirs of lead or asphalt.

597,312—Jan. 11, 1898.—Combined Excavating and Backfilling Apparatus for Sewers—D. I. Calhoun, Chicago, Ill.

597,515—Jan. 18, 1898.—Railway for Highways—H. L. Stillman, Charleston, R. I.

597,590—Jan. 18, 1898.—Bridge—A. G. Pratt, Hammondsport, N. Y. The arch is composed of a series of arched metallic sheets, which are held together by means of a grooved binding member, which receives the adjacent edges of the sheets.

TRADE NOTES.

The Atlas Cement Works, near Northampton, Pa., will be enlarged, increasing its daily capacity to 10,000 barrels per day.

The Dixon Garbage Crematory Co., Toledo, O., has been incorporated by Geo. J. Sherman, Wm. H. Crawford, E. J. Little and W. W. Lewis of Toledo and David Joy of Findlay, O.

The Pacific Asphalt Co., San Francisco, Cal., has been incorporated by Alfonso Haskins, Elmira Haskins, R. C. Leavenworth, O. M. Leavenworth and Ira G. Haskins of Oakland.

The William E. Dean Co., Stroudsburg, Pa., has been incorporated to grade, pave and curb streets, etc. Wm. E. Dean, 58 W. 127th street., New York City, treasurer.

The Suburban Improvement Co., Camden, N. J., has been incorporated to improve streets, sidewalks, construct sewers, culverts, etc., by Geo. W. Bailey, Wenonah, N. J.; Howard L. Merritt, Collingwood, N. J.; Wm. S. Casselman, Camden, N. J.

The Flush Tank Co. of Aurora, Ill., has been consolidated with the Aurora Iron Works and will continue business under the former name.

Henry R. Worthington, New York City, contemplates enlarging his present storage capacity for castings for standard sizes of pumps.

The Gates Iron Works, Chicago, Ill., has awarded to the Pittsburg Bridge Co., a contract for doubling the size of the shops by the addition of an 80x366 ft. steel and brick building, equipped with modern machinery.

The Van Port Brick Co., Vanport, Va., has been organized to manufacture all kinds of brick by Edward P. Botsford, Frank Moore, Wm. T. Dunn and Geo. Rollins of Pittsburg, Pa.

The New Jersey Portland Cement Co., Perth Amboy, N. J., has been incorporated to manufacture and sell cements. The incorporators are: Henry B. Needham, New York; Wm. Kole, New Rochelle, N. Y.; Philip Lindsley, Raritan, N. J.; Harry Robinson, Fanwood, N. J.; Charles C. Kelley, Jersey City, N. J.

The Grassland Brick & Tile Company, Grassland, Ill., has been incorporated by L. Heilgenstein, George Kindlinger, Frank Basler, jr., and Christ Basler.

A 36-inch main leading from the Ridgewood pumping station to the reservoir, in Brooklyn, burst a day or two ago, causing some damage through the escaping water and relieving instantly the pressure from the new twenty-million triple expansion Worthington pumping engine. The effect of this, which in the case of a fly-wheel engine might have been of most serious consquence, was to illustrate the absolute security, under such circumstances, of the high duty attachment to this engine. The loss of pressure in the main was followed immediately by a corresponding decrease in the power of the compensating cyclinders, which rendered the engine unable to complete its stroke and brought it to a standstill. It was found to have sustained no injury whatever, although at the time of the accident it was running under full load and at more than full speed.

O. H. Norsline is building a paving brick plant at Punxsatawney, Pa.

The Indiana Bridge Co., Indianapolis, Ind., has been incorporated.

The California Asphalt Co., has erected a plant within the city limits of Ventura, Cal., having a capacity of 900 tons of asphalt a month. The works were put in operation Dec. 25, after being closed for three months while the improvements were being made.

A portable asphalt plant is reported to have been constructed at Denver, Col., by J. A. McIntyre, ex-city engineer.

The Trinidad Asphalt Mfg. Co., St. Louis, Mo., has been incorporated by Chas. W. S. Cobb, Hobart Brinsmade, J. Brooks Johnson, George M. Brown, Frank W. Terpenning, J. M. Hays and John M. Wood.

A new asphalt company has been organized by S. H. Shearer, who was until recently superintendent of the Western Paving & Supply, Indianapolis, Ind. Mr. Shearer, it is stated, will use asphalt supplied by the Hays, Turner & Cooper Mining Co.

The Novaculite Paving Co., East St. Louis, Ill., has certified to an increase in capital stock to $12,000.

The Minneapolis Hydraulic Cement Co., Minneapolis, Minn., is, according to press reports, erecting a new factory which will have a capacity of 250 bbls. a day.

The Mack Paving Co., New York City, has been incorporated with the following directors: John M. Mack, James M. Mack, Joseph M. Mack, Philadelphia; Arthur W. Sewall, Pittsburg; A. J. Ross, Jersey City, N. J.; Paul Sheldon, C. J. Sullivan, New York.

The Utica Paving Co., Utica, N. Y., held its annual meeting Jan. 17, electing the following officers for one year; President, Chas. I. Williams; vice-president, John Carney; secretary and treasurer, John L. Murray; directors, Chas. I. Williams, John L. Murray, John Carney, Richard Richards and Henry W. Miller.

Henry R. Worthington, finding their present enormous output of steam pumps inadequate to properly meet the requirements of their trade, are making enlargements which will enable them to increase their output over 30 per cent., especially in pumps of 10-inch stroke.

IMPROVEMENT AND CONTRACTING NEWS

PAVING.

Bloomington, Ill.—A number of members of the board of local improvements visited Peoria Jan. 11 to examine that city's street paving.

Harrisburg, Pa.—The Monongahela Boulevard Co. of Pittsburg was incorporated Jan. 19 by C. L. Woods, F. M. Ross, J. H. Millholland, C. T. Marsh and W. S. Mitchell.

Chattanooga, Tenn.—The Times quotes Chairman Erwin of the board of public works as saying that the Kentucky asphalt pavement laid a few months ago on Market street is a failure.

Detroit, Mich.—Press reports state that the Talbot Paving Co. has made charges against the board of public works, claiming that favoritism is shown certain contractors.

Los Angeles, Cal.—The board of public works decided, Jan. 4, to send the samples of local asphalt to Prof. S. P. Sadtler, Philadelphia, Pa., for chemical and physical tests.

About seventy miles of new macadam roads were constructed in New Jersey during 1897 at an outlay of $100,000 on the part of the state and $250,000 on the part of localities and individuals.

Worcester, Mass.—A comprehensive plan for relieving the congested business centers of this city by widening the streets and laying out new ones was outlined by Thos. J. Sawyer before the board of trade Jan. 6.

Valparaiso, Ind.—Press reports state that the farmers in the southern portion of Lake county propose to lay steel rails over the county roads for team traffic. A switch for passing teams will be placed every half-mile.

Denver, Col.—The appropriation bill for 1898 provides for the creation of a fund of $7,500 to be utilized in keeping the paved streets in repair. The intention is to purchase asphalt by the ton and have the work done under the supervision of Henry Himber, sewer inspector.

Kansas City, Mo.—Complaint was made recently to Mayor Jones of Kansas City, Mo., that Geo. J. Baer and Geo. J. Youmans, members of the board of public works, were violating the city charter by being interested in city contracts. The mayor asked that they disprove the charges or resign. An investigation of the charges began Jan. 21, when testimony was introduced tending to show that some personal feeling was back of the charges.

Albany, N. Y.—The bill to authorize the city of New York to complete certain improvements in the borough of Brooklyn, which were pending Dec. 31, is said to be meeting with some opposition, owing to its imposing upon taxpayers a great deal of unnecessary and wasteful work.

Newark, N. J.—(Special)—The guarantee required on asphalt pavements has been extended from five to ten years. The bond required from the contractors will be one-third of the cost of the pavement. "Trinidad lake asphalt or any other equally as good" will be required by the specifications.

Columbus, O.—(Special.)—James A. Fanning, clerk board public works, says that the strip of pavement laid under the direction of George F. Averill, last September, is rapidly breaking up, and to every appearance is a failure as a permanent pavement. The pavement was laid alongside the City Hall building during the meeting of the mayors and councilmen.

Baltimore, Md.—In his annual report to Mayor Malster, W. A. Hanway, city commissioner, favors brick as an economical form of improved pavement, and recommends further and more extensive trials of it. He also recommends that a thorough test be made of the plan to lay sheet asphalt over cobblestones already down.

Chicago, Ill.—Comptroller Waller's estimates for 1898 are being prepared, so that the annual appropriation ordinance may be passed by the council by Feb. 1. He asks for $16,000,000.

The policy of the state of Massachusetts in building roads in small sections, scattered over eighty townships in 1897, as an object lesson, is having the desired effect, for local officials have been compelled by public opinion within their own towns, to build better roads from the money appropriated by these towns. The result has been been that twenty-five towns have appropriated fairly liberal sums of money for the construction of roads of the same type.

Trenton, N. J.—A bill will be drafted to be presented to the legislature permitting the cities of the state to provide for the repaving of their streets by issuing 4 per cent. bonds, the amount of the proposed bonds to be limited in each city according to population at the rate of $4 per capita and a sinking fund established in each city for the liquidation of the bonds. Mayor Fagan and the common council of Hoboken and the common council of Camden decided to draft the bill.

Detroit, Mich.—D. W. H. Moreland of the board of public works advocates brick paving for the streets having much traffic and asphalt for those exposed to less wear. He finds cedar pavements on concrete unsatisfactory, for blocks that are not worn at all on the top will be dry-rotted at the base. Asphalt in gutters is not favored, for water and refuse collect in them, causing the material to rot. He recommends about two feet of brick for the gutters of all streets paved with asphalt.

Baltimore, Md.—An ordinance has been prepared in behalf of the Wheelmen's Campaign Association to prevent needless destruction of pavements by tearing up the streets after an improved pavement is constructed. An ordinance is also pending before the highway committee making punishable by a fine of $40 for each offense in building fires on an asphalt pavement, or to allow kerosene, naptha, benzine or other oils to overflow upon asphalt pavements. Oil wagons will be compelled to carry drip pans.

Columbia, S. C.—A bill was passed in the house, Jan. 17, which will enable the city council to pave sidewalks. The law, as it has stood heretofore, has been declared unconstitutional by the courts. The new bill provides that the mayor and aldermen of any city in this state, of 10,000 inhabitants and upward, shall have power and authority to grade, pave, macadamize and otherwise improve the sidewalks of public highways and alleys and to assess one-half of the cost upon the abutting property-owners, the remaining half to be paid by the city.

Newark, N. J.—The street committee of the board of works decided, Jan. 17, in the new specifications, to require that the as-

phalt be of the standard of genuine Trinidad lake asphalt.

CONTEMPLATED WORK.

Springfield, Mo.—Asphalt paving is proposed for Boonville street.

Alliance, O.—Plans have been prepared for paving Main street with brick.

St. Joseph, Mo.—Several streets will be paved according to press reports.

Orient, L. I.—An effort is being made to have the main street of this village macadamized.

Wabash, Ind.—(Special.)—Robert P. Woods, city engineer, says more asphalt paving is talked of.

Newark, N. J.—An appropriation of $100,000 for paving and repaving the streets has been requested.

Hamilton, O.—A resolution was passed, Jan. 18, to pave Forest avenue, from High to Hydraulic.

Tarentum, Pa.—The question of issuing $55,000 of street and sewer bonds will be voted on Feb. 15.

Middletown, Conn.—The board of aldermen proposes to macadamize portions of fourteen streets.

Savannah, Ga.—An ordinance will be introduced in the council providing for the paving of Bull-st.

Elmira, N. Y.—Plans have been submitted for macadamizing First-st., between Cedar and Pearl. Ald. W. J. Buchanan.

Boston, Mass.—Estimates have been presented to the council for paving Norfolk-ave., from Magazine to Cottage-st.

Cleveland, O.—The Park Board took official steps, Jan. 19, toward having a shore drive constructed at Edgewater Park.

Reading, Pa.—Cherry-st., from Front to Eleventh-st., will be paved with vitrified brick. Samuel S. Hoff, city engineer.

Pittsburg, Pa.—Fourth-st., one block west and two blocks east of Broadway, will be paved with vitrified brick this year.

Grain Valley, Mo.—The county commissioners have been requested to extend the macadam road to Lone Jack.

Fairmont, W. Va.—The question of paving Water-st., from the suspension bridge to the Morgantown pike, will be voted on.

Milwaukee, Wis.—The question of constructing a boulevard from Mason-st. to the North Point pumping station is being discussed.

Saginaw, Mich.—The committee on pavements and sewers will report to the common council in favor of paving Germania-ave. with brick.

Kearney, N. J.—An ordinance was passed Jan. 11 for the improvement of Highland-ave., between Quincy and Afton-sts.

Decatur, Ill.—Street paving is contemplated next summer for S. Main, W. Wood, N. Monroe, S. Franklin, W. Decatur and Eldorado-sts.

Lima, O.—Preliminary resolutions have been adopted for paving Main-st. for a distance of 1¼ miles with brick. C. E. Lynch, city clerk.

Kansas City, Mo.—The construction of a driveway along Brush creek, from Broadway to Cleveland-ave., thence south to Swope park, is proposed.

Parnassus, Pa.—A proposition to issue $10,000 of street improvement and sewer bonds will be voted on Feb. 15. W. J. Steward, prest. coun.

Easton, Pa.—According to press reports, a proposition has been submitted to the grand jury for improving the highway between Easton and Martin's creek.

Fort Wayne, Ind.—(Special.)—H. B. Mooning, city clerk, says there is some talk of paving Calhoun-st., but the kind of material has not been decided upon.

Utica, N. Y.—Resolutions have been introduced for paving portions of Liberty, Court, Aiken, Union, Bleecker, Eagle, Blandina, Sunset, Albany and Hicks streets.

Punxsatawney, Pa.—(Special.)—Eli Coulter, C. E., says the question of increasing the borough indebtedness for street paving, $24,000, will be voted on Feb. 15.

St. Paul, Minn.—The city clerk has been authorized to prepare ordinances for a boulevard along the river on the west side of the city, from Delos-st. to Smith-ave.

Dayton, O.—(Special.)—E. Brentlinger says the city council, at its last meeting, requested the B. C. A. to take the necessary measures for paving several streets and alleys.

Pontiac, Mich.—The council proposes to pave the streets this year with vitrified brick or cedar blocks on concrete. City Engineer Fisher has made a survey of the streets.

Vicksburg, Miss.—A petition for paving Washington-st., from South to Grove, with vitrified brick is being circulated by Alderman W. O. Smith and City Attorney John Brumini.

Boulder, Col.—(Special.)—E. K. Stafford, city clerk, says there is talk of paving the main business streets with asphalt or stone, but nothing definite has been decided upon.

Rankin, Pa.—An ordinance was passed by the borough council, Jan. 5, to pave Kenmawr-ave., from Fourth-ave. to the borough line, and to compel the laying of sidewalks in the borough.

Johannesburg (Transvaal), So. A.—The town council is reported as having decided to secure a loan of about $10,000,000 for constructing improved roads and a sewerage system.

Indianapolis, Ind.—Engineer's plans have been ordered for paving Gray-st., from Louisiana to South, with brick, with cement sidewalks and cement walks on East-st., from South to Morris.

Harrisburg, Pa.—An ordinance was introduced in select council, Jan. 10, for paving Seventh-st., from Boas to a point as far as the appropriation will reach, with vitrified brick on concrete.

Albany, N. Y.—Plans have been prepared by Horace Andrews, city engineer, for repaving and curbing Morton-st. with repressed brick or granite blocks and laying a cement walk along the Beaver park frontage.

Morristown, Ind.—The town board has decided to advertise for proposals to place $3,000 of municipal bonds for the completion of street improvements which were begun in 1897, but were delayed by litigation.

Grand Rapids, Mich.—Estimates have been made for paving Crescent-ave. as follows: Cedar blocks on concrete, $16,460; brick on concrete, $20,388; asphalt with combined curb and gutter, $22,946; asphalt entire, $23,490.

Chattanooga, Tenn.—The property-owners on W. Eighth-st., between Broad and Chestnut, have asked the city council to remove the granite paving on that street and construct a brick or other suitable pavement instead.

Oakland, Cal.—A new list of streets has

been prepared by Street Superintendent Miller, upon which the paving has become so worn that they must be resurfaced or re-macadamized. The list includes portions of 55 streets.

Macon, Ga.—The board of public works has been authorized to advertise for bids for paving Ocmulgee-st., from Fourth to Fifth-st., with granite cubes. Paving is also proposed for Mulberry, Cherry, Second and Third-sts.

Pittsburg, Pa.—Specifications have been completed for about $160,000 worth of highway improvements, for which bids will be asked soon by Director Bigelow.

Chicago, Ill.—A resolution was adopted Jan. 25, by the board of west park commissioners, authorizing the president and secretary of the board to petition the city council to pave Homan-ave., from Madison to Lake-st., with asphalt.

Denver, Colo.—The residents on Logan-ave., between Colfax and Eighth-aves., have requested that the street be paved with a 6-in. layer of disintegrated white hornblende gneiss, which is obtained from Sherman mountain, Wyoming.

Jacksonville, Fla.—Hospital-st. will be paved with brick. Aldermen Watts, Center and Masters have been appointed a special committee to act with the street and law committee in regard to deciding what kind of brick to use.

Canton, O.—(Special.)—The proposed improvements for next summer include paving with vitrified blocks W. Lake, W. Tenth, E. Eighth and S. Cherry-sts., macadamizing Mahoning-st., from E. North to Lake; grading, lawning and flagging E. Seventh-st.

Brooklyn, N. Y.—A bill was introduced in the senate, Jan. 13, providing for the improvement and extension of a portion of the easterly part of Surf-ave., at Coney Island.

Chicago, Ill.—Ordinances were passed by the local board of improvements, Jan. 22, providing for the construction of twenty-five miles of cement sidewalks, paving eighteen miles of streets and laying two miles of water service pipes. L. E. McGann, comr. pub. wks.

Kansas City, Mo.—The board of public works decided, Jan. 14, to pave with brick or asphalt, Southwest boulevard, from Main-st. to the state line, two miles, and Twenty-fourth-st., from the Southwest boulevard to Fairmount-ave., about one-half mile.

Scranton, Pa.—Estimates for repaving Carbon-st., from Penn-ave. to Lackawanna river, have been received as follows: Asphalt, $7,599; brick, $5,965; E. F. Blewitt, cy. eng. Paving is contemplated for N. Main-ave. and Providence road in North Scranton.

Trenton, N. J.—A macadam road has been petitioned for from Crosswick's creek to the White Horse road, and from the creek to Bordentown. The White Horse road will be macadamized, which, with the above improvements, will give a macadam road from this city to Atlantic City.

Philadelphia, Pa.—The council's committee on highways has approved a large number of ordinances for street paving, the most important of which is paving Broad-st., from Cayuga-st. to Fisher's lane, with asphalt. This involves 26,000 sq. yds. of paving, of which 6,300 yards is at intersections.

Spokane, Wash.—Plans are being prepared for about 26,000 sq. yds. of brick or asphalt pavement on Riverside-ave. during the summer. About 45,000 sq. yds. of additional brick or asphalt pavement is also proposed to be laid during 1898. Ordinances have not yet been prepared for this work. O. A. Weile, cy. engr.

CONTRACTS TO BE LET.

Canton, O.—(Special.)—Sealed proposals will be received until Feb. 5 for 12,000 sidewalk bricks.

Muncie, Ind.—Sealed proposals will be received until Feb. 7 for the construction of cement sidewalks. F. Elrod, cy. clk.

Batavia, O.—Sealed proposals will be received until Feb. 3, for the construction of certain free turnpikes. John W. Davis, clk. bd. comrs.

North Stonington, R. I.—Bids will be received until Feb. 7 for building, grading and improving three sections of roads. Geo. A. Pendleton.

Hazleton, Pa.—Bids are asked until Feb. 4 for 18,000 sq. yds. of vitrified brick or block paving, on concrete base. A Brooks Celiax, cy. engr.

Norwood, O.—Sealed proposals will be received until Feb. 12 for macadamizing Montgomery pike, from Ivanhoe-ave. to Mound-ave. W. E. Wichgar, vil. clk.

Irvington, Ind.—Bids will be received until Feb. 21 for paving Washington-st., from the west corporation line to Line-st., a distance of 1½ miles, with asphalt, brick or macadam, with combination and limestone curbs. Town Bd.

Burlington, Vt.—Bids will be received until Feb. 9 for the construction of about 5,320 ft. of 8-in. macadam roadway, 18 feet wide, with earth wings, catch basins, etc., at Fort Ethan Allen. Guy Howard, captain and asst. quartermaster U. S. Army.

South Bend, Ind.—Sealed proposals will be received until Feb. 14, for grading Dunn-st., from Chapin to Scott, and Kosciusko-st., from Sample to Dunham; grading Cedar-st., from Hill to Eddy, and curbing and paving sidewalks on Cedar-st., from Hill to Francis. L. A. Hull, cy. clk.

Indianapolis, Ind.—Sealed proposals will be received until Feb. 2 for paving Alabama-st., from Twenty-third to Twenty-fifth, with asphalt; graveling first alley south of South-st., from East to New Jersey; cement sidewalks on Depot-st., from Warren to Putnam; graveling and curbing Oriole-st., from Lincoln to a point 493.6 ft. north. M. A. Downing, prest.

CONTRACTS AWARDED.

Stapleton (S. I.), N. Y.—The contract for improving the Southfield boulevard was awarded Jan. 5 to Jos. Johnson.

Keokuk, Ia.—The contract for furnishing 500 yds. of stone for macadam has been awarded to Cameron & McManus at 74 cts.

Bedford, Ind.—The county commissioners have awarded to Amos Mussellman & Co. of Anderson a contract for 14 miles of gravel road for $32,675.

Boston, Mass.—The contract for constructing the Columbia road, from Stanwood-st., a distance of 3,236 ft., with macadam on telford base, has been awarded to H. P. Nawn for $38,042.

Toledo, O.—The contract for paving Nevada-st., from Oak-st. to Spring Grove-ave., was awarded, Jan. 13, to Wm. McMahon for $21,359.33. The street will be paved with the Harris paver.

Lima, O.—The contract with the Columbia Construction company of Syracuse, N. Y.,

which has been in litigation for some time, for paving Market-st. with asphalt, has been signed by Mayor Baxter.

Rochester, N. Y.—The Rock Asphalt company was awarded the contract for 1,300 sq. yds. of asphalt paving in Willard Park at $2 a sq. yd. for asphalt and 70 cts. per. lin. ft. for 900 ft. 6-in. curbstone.

Brooklyn, N. Y.—J. F. Maillie has secured contracts for improving Ocean-ave., from Avenue U to Bay-ave., for $16,573.23, and for parts of Bay, Elm and Coney Island-aves. and Sixtieth-st., for $9,772.30.

Newark, N. J.—Whittaker Bros. of Little Falls, N. J., secured a contract Jan. 10 for paving a county road with telford for $5,211.72, and Wright & Smasley of Orange, N. J., a contract for one road for $4,079.95.

St. Louis, Mo.—Contracts for paving several streets with brick and granite blocks have been awarded as follows: Henry Ruckert, three contracts, $845.65, $1,576.55, $1,388.50; Hill-O'Meara Construction company, $5,983.35.

Jersey City, N. J.—Contracts have been awarded as follows. Fairview-ave., Barber Asphalt Paving company, $5,932.20; Griffith-st., Edward O'Donnell, $3,457.33; Forrest-st., New Jersey Mexican Asphalt company, $7,390.08.

Washington, D. C.—Awards for laying about 800 square yards of asphalt and 580 square yards of cement pavements at the jail in this city have been made as follows: Augustus Lapreaux, Washington, cement, 54 cts. per square yard; Cranford Paving company, Washington, asphalt, $1.90 per square yard.

Birmingham, Ala.—Mehaffey & Co. have been awarded the contract for brick paving at $1.45 a sq. yd., and for artificial stone sidewalks at $1.19¾ a sq. yd. The contract for granite curbing was awarded to C. M. Burkhalter & Co. at 38 cts. a ft. for 6-in. and 35 cts. for 5-in. curbing.

Montgomery, Ala.—The contract for paving three streets with vitrified brick was awarded Jan. 7 to J. H. Talbot & Co. of Detroit, Mich., and D. W. Ford & Co. of Montgomery, Ala. The Jefferson paver, made by the Coaldale Brick & Tile Co., will be used. The contracts aggregate $50,000.

Cincinnati, O.—The contract for paving and repairing brick sidewalks in the Western district was awarded Jan. 6 to Thos. Evans for $1,030.26, and in the Eastern Districts to John Burns for $1,330.60. The contract for macadamizing Delta-ave. has been awarded to Reubel Bros. for $30,326.

Omaha, Neb.—J. B. Smith of Chicago was the lowest bidder, Jan. 14, for asphalt paving as follows: Class B, No. 3, $1.37 a sq. yd.; class D, $1.29; class C, $1.35. The Des Moines Brick company was the lowest bidder for brick paving, as follows: Class A, 1-yr. guarantee, $1.44; class A, 5-yr. guarantee, $2; class C, 97 cts.

Salisbury, Md.—A contract has been awarded to Thos. H. Mitchell for paving Main-st. with vitrified brick. Mr. Mitchell agrees to furnish 30,000 brick provided the city will pay the expense of laying them, which will make the total cost about $1.75 a sq. yd. The work is an experiment and should it prove successful the subject will be further taken up.

Portland, Ore.—Street improvement contracts were awarded Jan. 15 as follows: E. Sherman-st., between E. Seventh and E. Twelfth, grading, graveling and building sidewalks and crosswalks, A. Hamilton, $2,010.37; Kirby-st., from Shaver to Central Albina, grading and building walks, Lewis Janin, $1,517.56; Hawthorne ave., from E. Sixth to E. Twelfth, repairing grade and laying coat of gravel, W. J. Kelly, $824.43.

Kansas City, Mo.—(Special.)—Henry A. Wise, cy. engr., awarded, Jan. 8 to the Parker-Washington company contracts for paving with 1½-in. asphalt, 1½-in. binder and 4-in. concrete the following: Euclid-ave., from Seventh to Eighth, $1.90 a sq. yd.; Thirteenth-st., from Woodland to Euclid, $2, Brooklyn-ave., from Pendleton to Lexington, $2; Broadway, Fourteenth to Sixteenth, $2; Park-ave., Ninth to Twelfth-sts., $2. The Barber Asphalt Paving company bid $2.12 on each street.

Denver, Col.,—The Western Bermudez Co. presented the lowest bid, Dec. 27, for paving Colfax-ave., from Broadway to York, at $1.50 a square yard; total, $82,351.19. The Colorado Paving Co. bids were as follows: Trinicol, $1.55; Waldorf, $1.75; Pacific, $1.80; Trinidad, $2.20. The Denver Paving Co. bid $1.98 on Alcatraz asphalt. Owing to a temporary injunction being secured against the board of public works to prevent its letting the contract the bids were placed on file.

SEWERS.

Hamilton, O.—The sewerage commission elected officers for the ensuing year Jan. 18 as follows: President, Peter Schwab; vice-president, Lazard Kahn; clerk, M. O. Burns.

Baltimore, Md.—Mayor Malster decided, Jan. 13, to continue the sewerage commission, as its advice and perhaps further service will be needed if the council constructs the sewerage system.

Rochester, N. Y.—A bill has been introduced in the assembly to the effect that the West Side sewer is completed and that, according to the original act, the West Side sewer commission should go out of office.

Memphis, Tenn.—A tunnel is being constructed to furnish an outlet into the Mississippi for a system of sewers in the southern and southeastern portions of the city and the suburbs, should they be annexed.

Columbus, O.—A sewer expert has been in the city for some time consulting with the director of public improvements over the examination of the sewer system on the West Side. Several methods of improvement have been suggested, but none adopted.

Boulder, Col.—(Special.)—E. K. Stafford, city clerk, says that "the city has just completed its sewer system and is now well sewered. We have an excellent water system, owned by the city, and are adding to it every year as the increasing population demands."

Chicago, Ill.—A committee, consisting of John Powers, William J. Murphy, Frank McCarthy, C. W. Probst, William H. Lyman and Charles Martin, left Jan. 18 to inspect the concrete sewer in Reading, Pa. The committee will report to the council upon the advisability of substituting concrete for brick in the local sewerage system. During the last year the bureau of sewers has constructed 8,140 sewers, the total length of which is 218,177 feet.

CONTEMPLATED WORK.

Redfield, S. D.—The construction of a sewerage system in this city will begin in May.

Cambridge, Md.—The construction of sewers, at a cost of $5,000, is recommended by Mayor James.

Tarrytown, N. Y.—The State Board of Health has approved plans for a sewerage system for this village.

Southbridge, Mass.—Plans and estimates for constructing a sewerage system have been completed.

Youngstown, O.—A resolution is pending in the council for the construction of a sewer in S. Market-st

Hutchinson, Kas.—Petitions are being presented to the city for sewers in different parts of the city.

Nashua, N. H.—City Engineer Dean has been authorized to prepare plans for trunk sewers in certain streets.

Brooklyn, N. Y.—The citizens of Bay Ridge and Fort Hamilton will secure legislation for the construction of sewers.

Rochester, N. Y.—The construction of sewers in four streets is proposed; estimated cost, $12,000. T. D. Pulver, cy clk.

Louisville, Ky.—An appropriation of $41,500 for the construction of sewers for the year ending Aug. 31, 1898, has been made.

Springfield, O.—The question of constructing 24 to 18-in. pipe sewers in several streets is being considered by the council.

St. Cloud, Minn.—The construction of a cement culvert 253 ft. long on N. Sixth-st. is contemplated by the council.

Los Angeles, Cal.—City Engineer Dockweiler has been instructed to prepare plans for a storm drainage system.

Canton, O.—(Special.)—The construction of house sewers is contemplated in districts No. 2 and 3.

St Louis, Mo.—Sewers will be constructed in the Warren-ave. sewer district at a cost of about $24,500. B. H. Colby, sewer comr.

Le Sueur, Minn.—The question of constructing a 30-in. pipe sewer from Main and Ferry-sts. to the Clifton corner is being agitated.

Sharon Springs, N. Y.—The state board of health has approved plans for a sewerage system for this village, according to press reports.

Cambridge, Md.—A bonded debt of $5,000 has been recommended by the mayor, according to press reports, for the construction of sewers.

Jersey City, N. J.—The construction of 3,400 ft. 54-30-18-in. steel pipe and 530 ft. 30-inch. brick sewers is proposed. F. E. Ferris, surveyor.

Crown Point, Ind.—A preliminary survey for a sewerage system for this town is being made by the Knight Engineering company of Wabash, Ind.

Parkersburg, W. Va.—Plans will be prepared by John V. Dunbar, cy. engr., for the extension of the sewerage system in the Fourth and Fifth wards.

Mount Vernon, N. Y.—The sewer committee has under consideration six propositions for tide-water outlets, costing from $125,000 to $297,000.

Fond du Lac, Wis.—The city will vote, in the spring, on the construction of a new sewer, plans for which have been submitted to the council.

Washington, Ind.—An epidemic of typhoid fever in this city is attributed by the physicians to impure water. The city has no sewerage system; population, 10,000.

Crawfordsville, Ind.—The state board of health has been asked for advice in reference to suitable plans for improving the sewerage system of this city.

Elgin, Ill.—A plan was presented to the city council Jan. 18 for a large sewer, designed to drain the northeastern part of the city. Alderman Schrader interested.

Milwaukee, Wis.—An appropriation of $97,000 for the general extension of the sewerage system during the next season has been made. G. H. Benzenberg, cy. engr.

Guelph, Ont.—The appointment of a committee to consult with the city engineer in regard to plans for a sewerage system has been recommended by the mayor.

Tacoma, Wash.—Plans are being prepared, according to press reports, for improving and extending the sewerage system. Comr. Pub. Wks. Dougherty.

Lansingburgh, N. Y.—Justice Lucas, Town Clerk Shaw and Dr. H. L. Ives, the committee appointed to consider the Fifth-ave. sewer, has decided that the sewer is a necessity.

Ansonia, Conn.—The question of constructing sewers in several streets is being considered by John Peterson, E. S. Goody and Benjamin F. Leonard, committee on sewers.

Ft. Wayne, Ind.—The property owners of Bloomingdale have requested the board of public works to construct a sewer on Banhold, Fourth and Andrews-sts. this spring.

Colville, Wash.—The citizens of this place are moving to establish a drainage district to comprise a tract of about 20,000 acres of submerged land along the Colville river.

St. Paul, Minn.—The board of public works adopted specifications, Jan. 18, for the construction of the new Cedar-st. sewer, from Eighth-st. to the river; estimated cost, $6,068.

Columbus, Neb.—The business men have organized for the purpose of establishing a sewerage system and a plan submitted by Surveyor Gottschalk has been adopted as feasible.

Pittsburg, Pa.—About 6½ miles of sewers will be built during the next summer, of which 4½ miles will be 15-24-inch pipe and 2 miles brick and stone sewers from 3 to 6 feet and 9-inch in diameter.

Quincy, Ill.—Specifications have been completed by E. R. Chatten, city engineer, for a storm sewer in Cedar-st. The sewer will be four blocks long, exclusive of the stone culverts already laid, and will be built in six sections.

Taunton, Mass.—The construction of the proposed Cobb Brook trunk sewer will be done under the direction of the board of sewerage commissioners. The sum of $83,500 has been appropriated for the sewer.

Woonsocket, R. I.—The sewer committee has recommended the construction of sewers at an estimated cost of $35,000, and the city engineer has recommended an appropriation of $10,000 for further work at the filter field.

Newark, N. J.—Notice of intention will be given for the construction of a relief sewer, from Market and Arlington-sts., to the river, through Market, Plane, Warren and Halsey-sts., Park place, Broad-st., Military Park and Center-st.

Normal, Ill.—Bell & Mellush, who were engaged by the town council to prepare plans and estimates for a sewerage system, have

laid out two miles for the main sewer for the council to choose between; estimated cost, $17,000.

Kansas City, Mo.—H. A. Wise, cy. engr., will, according to press reports, submit propositions to the board of public works, for the extension of the Turkey Creek sewer and for the construction of an intercepting sewer or the extension of certain large sewers.

Indianapolis, Ind.—Resolutions were adopted Jan. 10, for the construction of sewers in portions of Pratt, St. Joseph and Tenth-sts. The board of public works ordered, Jan. 19, engineer's plans prepared for the construction of sewers in the alleys east and west of College-ave., from Twenty-fifth to Twenty-sixth-sts.

The question of issuing bonds for the construction of sewerage systems will be voted on at the following places: Tarentum, Pa., Feb. 15, $55; Vailsburg, N. J., Feb. 23; Parnassus, Pa., Feb. 15, $10,000; Santa Ana, Cal., Feb. 5, $65,000; Media, Pa., Feb. ; Millvale, Pa., Feb. 15, $25,000; Avalon, Pa., Feb., $26,000.

Toledo, O.—City Engineer Brown has recommended an additional main sewer in Adams-st., from Vermont-ave. to the river, as a means of relieving the strain on the sewer in Cherry-st. The council committee on sewers decided, Jan. 14, to prepare legislation for a new district sewer on Adams-st., from Sixteenth-st. to the river, to relieve Jackson-st.

Washington, D. C.—The commissioners have approved allotments for use in the current quarter of the fiscal year, as follows: Cleaning and repairing sewers and basins, $10,000; main and pipe sewers, $7,000; suburban sewers, $5,000; Tiber creek and New Jersey-ave. sewer, $1,500; automatic flushing tanks, $700; Rock creek and B-st. sewer, $1,000.

Baltimore, Md.—The council committee on sewerage has decided to report in favor of the filtration system of sewage disposal, using sandy land near Glen Burnie, Ann Arundel County, for that purpose. The commission estimates the total cost of the filtration system at $17,476,803, of which nearly $6,000,000 would be needed during the next few years. The question will probably be voted on next November.

CONTRACTS AWARDED.

Shelby, O.—The contract for constructing sewers was awarded to A. H. Gardner of Bucyrus, O., for $11,419.

Buffalo, N. Y.—The contract for constructing a sewer in the Abbott road was awarded, Jan. 13, to John Harrer, for $89,603.36.

Mexico, Mex.—Press reports state that the contract for constructing sewers in this city has been awarded to L. E. Miller of Cape May, N. J.

Indianapolis, Ind.—The contract for constructing a sewer with branches in Williams-st. has been awarded to Hudson, Jenkins & Co., at 97 cts. a lin. ft.

Youngstown, O.—The contract for constructing 2,300 ft. of 48-in. brick sewer was awarded, Dec. 27, to C. R. and S. H. De Groodt for $9,999.

Lake Forest, Ill.—Press reports state that the contract for constructing 9,000 ft. of sewer has been awarded to Jas. Cape & Son, of Racine, Wis.

Little Falls, N. Y.—Thos. Kearney was awarded the contract for constructing a one-acre filter bed, with Babcock conduits and stone drain, for $14,900.

Niagara Falls, N. Y.—Contracts for constructing sewers have been awarded as follows: Contract No. 71, Gus Rickert, Niagara Falls, $7,402.77; No. 72, Makin & Cookman, Niagara Falls, $939.90, and No. 73, $6,221.55; No. 74, Gus Rickert, $1,752.04.

Spokane, Wash.—The contract for constructing the Maple-st. sewer, from Fifth to Eighth-ave., has been awarded to O. Simpson for $2,994.50. The work is to be completed by March 27.

Scranton, Pa.—Bids were received Jan. 13 for constructing the 17th District main sewer as follows: Vincent O'Hara, $53,000; E. S. Williams, $48,000; Flanaghan & O'Hara, $35,742; Dunn Bros., $33,216.90.

Albany, N. Y.—The contracts for repairing and rebuilding culverts were awarded, Jan. 3, as follows: No. 94, Western Div. Erie canal, Martin & Barlow, Seneca Falls, N. Y., $4,510.25; Nos. 42 to 46, Western Div. Erie canal, John Calnan, Rochester, N. Y., $8,860.15.

Louisville, Ky.—The contract for furnishing sewer brick has been awarded as follows: No. 1, for new sewers, being $11.00 a 1,000; for repairs, $11.50; No. 2, $9.00 a 1,000. They have also been awarded the contract for furnishing sewer pipe to the city at 7, 11, 16, 20, 31, 45, 55, 65 and 75 cts., with double strength pipe at $1.00, $1.45, $1.75 and $2.50, according to quality desired.

Steubenville, O.—Bids were received Jan. 13 for constructing a sewer on S. Fourth-st. to connect the telephone factory, a distance of 360 ft., as follows: Castner Bros., 94 cts. per lineal ft., complete, and manholes $17 a piece. Floto Bros., 98 cts. per lineal ft., complete and $33 a piece for manholes. Moran, Sharp & Freeman, $1.30 per lineal ft., complete, and manholes $40 a piece.

Houston, Tex.—Bids were received Jan. 17 for the construction of sewers on portions of Houston-ave. and Edwards-st., the work involving: 800 lin. ft., 18-in. pipe; 715 ft., 12-in.; 980 ft., 8-in.; 50 6-in. connections; 6 manhole covers; 20 catch basins; 30,000 brick for manhole covers and catch basins. Bids were made by R. C. Storms, J. J. Settegart, jr., C. W. Olcott and H. Schurder.

Cincinnati, O.—The contract for constructing a trunk sewer on Garfield-ave., Boldface road and Ravine was awarded, Jan. 14, to Wilson & Strack, for $27,214.30. The company's bid, in detail, was as follows: 400 lin. ft. 5 ft. brick sewer, $3.80; 2,465 lin. ft. 4-ft. brick sewer, $3.08; 1,393 lin. ft. 3½-ft. brick sewer, $2.45; 320 lin. ft. 3-ft. brick sewer, $2.23; 200 lin. ft. 2½-ft. brick sewer, $1.70; 132 lin. ft. 6-ft. pipe sewer, 10 cts.; 65 lin. ft. 12-ft. pipe sewer, 25 cts.; 4 lin. ft. 15-ft. pipe sewer, 45 cts.; 212 lin. ft. 24-ft. pipe sewer, $1.10; 372 6-in. slants, 30 cts.; 3 12-in. slants, 70 cts.; 19 24-in. slants, $2.50; 3 catch basins, plan A, $60; 24 round manholes in brick, $35; 580 cubic yds. rubble masonry, $4; 16,450 cubic yds. excavation, 60 cts.

CONTRACTS TO BE LET.

Salem, O.—Bids are asked until Feb. 2 for constructing 1,350 ft. of 18-in. and 850 ft. of 8-in. sewer.

Menominee, Wis.—Bids will be received until Feb. 3 for constructing an overflow sewer on Broadway. O. N. Tweet, cy. clk.

Indianapolis, Ind.—Sealed proposals will be received until Feb. 2 for constructing main and intercepting sewers in certain streets. M. A. Downing, Prest.

Rapid City, S. D.—Sealed proposals will be received until Feb. 5 for the construction of a sewerage system at the Indian Industrial school. R. P. Collins, supt.

Norwood, O.—Sealed proposals will be received until Feb. 12 for constructing a sewer in Montgomery pike, from Hudson-ave. to the B. & O. S. W. R. R. W. E. Wichgar, clk.

Glenville, O.—Sealed proposals will be received until Feb. 5 for the construction of sewers, drains, manholes and flushtanks, comprising Sec. 1 of Sewer district No. 2. Z. W. Morris, vil. clk.

Spokane, Wash.—Press reports state contracts will be let about the middle of February for constructing the Riverside-ave. sewer and constructing the Sprague-ave. sewer. Plans are being prepared also for constructing about 12,500 ft. of 10 to 24-in. pipe sewers on the North Side, which will be built during the year. O. A. Weile, cy. engr.

WATER-WORKS.

Duluth, Minn.—This city voted to purchase the Duluth Gas Water company's plants for $1,250,000.

Milwaukee, Wis.—A revision of water rates will soon be made in accordance with the opinion of City Attorney Van Wyck.

Fulton, N. Y.—The report of the committee on the proposed construction of a new water works system will be rendered about Feb. 1.

Detroit, Mich.—The Ann Arbor Water company has been enjoined from using the Huron river with which to supply the city with water, except in case of fire.

Orange, N. J.—The Orange Water Works company has offered to sell its water plant to the township of Bloomfield, the cost to be agreed upon by arbitrators.

Racine, Wis.—The Racine Water Works company has sued the city of Racine for $59,000.50 for using more water than the contract called for in flusning the city sewers.

Port Jefferson, L. I.—Franchises were granted Jan. 17 to two companies to supply this village with water, the Port Jefferson Water and Power company and the Port Jefferson Water company.

Escanaba, Mich.—All of the property owned by the Escanaba Water Works company will be sold at public auction by the order of the United States district court Feb. 7, Judge Emil conducting sale.

Peoria, Ill.—The Peoria Water Works was sold Jan. 14 for $1,500,000, being bid in by J. S. Stevens, acting for W. D. Barbon, Edward Woothout and Herbert C. Warren, of New York, the bondholders' committee.

Ogden, Utah.—Thos. D. Dee was appointed receiver of the Ogden Water Works Jan. 17 by Judge Rolapp as the result of the suit of the city against the Bear River Irrigation and Ogden Water Works company.

Philadelphia, Pa.—City Solicitor Kinsey says the scheme of the Schuylkill Valley Water company for furnishing a water supply to be sold at the rate of $1,500,000 a year for the next fifty years, is illegal, as it involves a contract which the municipality has no power to make.

New York City—Chief Bonner, of the New York Fire Depa tment, and Consulting Engineer Crowell have rendered reports regarding the proposed salt water pipe line system for fire protection, in which they recommend the system. Their investigation in other cities of the system has proved satisfactory.

Indianola, Ia.—Suit was brought Jan. 18 in the federal court for the foreclosure of a mortgage for $25,000 held to secure payment of bonds issued by the Indianola Water Works company. Application was also made for a receiver, and the court appointed E. H. Hunter. The suit was brought by the Illinois Trust and Savings Bank, as trustee.

Jamaica, L. I.—The Jamaica Township Water company and the Woodville Water company, of the town of Newton, made a joint offer, Jan. 21, to the board of public works of New York City to supply the borough of Brooklyn with a supply of 15,000,000 gallons a day of pure and wholesome water, suitable for drinking or potable purposes, at a rate lower than the city could obtain a similar amount itself from any other scurce.

Dallas, Tex.—Judge Boarman in the United States district court has granted a temporary injunction, returnable Feb. 21, restraining the Corsicana Water Works company from disturbing the condition of the property until the application of Coler & Co. of New York, who have applied for a receiver for the water works, is disposed of in court.

Newport, Ky.—Two parties outside of the city limits who were furnished supplies for their individual premises only, at the rate of 12 cts. per 1,000 gallons, have, according to Geo. Hornung, superintendent of the water department, extended the pipes to adjoining premises, without authority from the department, and have been retailing the water at rates greatly in excess of those charged by the city, making a good profit thereby.

New York City—A plan for procuring a water supply for Greater New York, which will come before the legislature at an early date, contemplates bringing water from the Adirondack lakes in an artificial river 60 to 80 feet wide and 15 feet deep, capable of furnishing 500,000,000 gallons of water daily, at an estimated cost of $67,000,000. The water will be brought through five counties, with pipe lines to supply Troy, Albany, Hudson, Poughkeepsie, Peekskill, Yonker and other places along the route.

Somerville, Mass.—The Mystic lake water supply has been abandoned and since Jan. 1 Somerville has been getting its supply from the Metropolitan water mains. It is expected that the Nashua river supply will be ready for use early in February. This will come through two miles of tunnel under the hills, and then by aqueduct seven miles, emptying into basin 5, the last begun by the city of Boston and taken by the state. The water is exceptionally pure in quality. The arrangements for the change were made by Frank E. Merrill of the Somerville water board, and involved a vast amount of labor.

Boston, Mass.—This city began to receive its water supply from the Metropolitan water works Jan. 1, on which date the Metropolitan water commissioners assumed control of all the water supplies which belonged to the city of Boston. The completion of the entire work, as now planned, will take four or five years more. The towns and cities within the Metropolitan district to be supplied by the big reservoir are: Boston,

Cambridge, Lynn, Somerville, Chelsea, Newton, Malden, Waltham, Quincy, Woburn, Brookline, Medford, Everett, Hyde Park, Melrose, Watertown, Wakefield, Stoneham, Revere, Arlington, Winchester, Milton, Saugus, Lexington, Winthrop, Belmont and Nahant.

CONTEMPLATED WORK.

Buffalo, N. Y.—A site has been purchased for a new pumping station.

Whitinsville, Mass.—A new reservoir is proposed for an increased water supply.

Dubuque, Ia.—The question of municipal ownership of the water works will be voted on.

The question of building water works has been favorably voted on at Alden, Ia., and Millvale, Mass.

Oshkosh, Wis.—The question of municipal ownership of the water works plant will be voted on March 8.

Fulton, N. Y.—A general plan and estimate of cost of municipal works will be made by Wm. R. Hill, of Syracuse.

Normal, Ill.—Plans and specifications for a water works system are being made by Geo. C. Morgan, C. E., of Chicago.

Media, Pa.—The question of extending the water works, erecting a standpipe, purchasing an 800,000 gal. pump, etc., will be voted on.

Lansingburgh, N. Y.—A report and estimate for the proposed additional water supply has been rendered by Village Engineer Hicks.

Evanston, Ill.—Commissioner of Public Works Williams has recommended the construction of another intake pipe at the water works.

Norfolk, Va.—An appropriation of $250,000 has been made for the purpose of securing a permanent water supply from Little Creek.

Hyattsville, Md.—A bill will be presented to the legislature authorizing the issue of $25,000 bonds for the completion of a water works system.

Abbeville, Ga.—The city authorities would like to make arrangements with responsible parties for putting in a water works system. T. F. Holton, mayor.

Des Moines, Ia.—Plans have been prepared by City Engineer Higgins for a new water works system. The pumps will have a capacity of 24,000,000 gallons daily.

Prescott, Ariz.—A bill was presented to congress authorizing this city to vote bonds, not to exceed $150,000, for the construction of a water works and sewerage systems.

Fonda, Ia.—About 4,000 feet of 4 and 6-inch cast-iron water pipe will be required for the proposed extension of the water main. R. F. Beswick, chrmn. water com.

Hot Springs, Ark.—The council is considering the formation of an improvement district to embrace the entire city, for purchasing the water and light plants or constructing new ones.

Vineland, N. J.—The report of the water, light and sewerage committee was presented to council Jan. 14. It involves, if adopted, an expense to the borough of about $218,000.

St. Helena, Cal.—A committee, composed of W. A. Bingham, W. W. Lyman, W. A. Mackinder, A. N. Bell and R. H. Pithie, has been appointed to consider the feasibility of constructing water works.

Gloucester, Mass.—The water commissioners are sending specifications to the pump manufacturers inviting bids for a new 4,000,000 gallon pumping engine for the West Gloucester pumping station.

Montgomery, Ala.—A report of the water committee, recommending the construction of new water works, was adopted Jan. 17, and the plans and specifications ordered prepared. A consulting engineer will be employed.

The question of constructing water works systems is being agitated at the following places: Lamoni, Ia.; Abingdon, Ill.; Evansville, Wis.; St. Ansgar, Ia.; Churchville, N. Y.; Dillon, S. C.

Spokane, Wash.—Bids will be readvertised for about March for a 5,000,000 gallon pump and one turbine wheel of 300 horse power. About four miles of 24-inch riveted steel water main will be laid in the spring. O. A. Welle, cy. engr.

Perth Amboy, N. J.—The superintendent of the Perth Amboy city water works was authorized Jan. 18 to prepare specifications for a compound condensing duplex pumping engine of 4,000,000 gallons daily capacity.

Brooklyn, N. Y.—An appropriation of $2,309,200 will be asked by James Moffett, deputy commissioner of water supply, for building a new reservoir at Flint park, with a capacity of 340,000,000 gallons, and for a steel conduit from Spring creek to Milburn.

The construction of water works systems is contemplated at the following places:: Takoma Park, D. C.; Sterling, Col.; Dallas City, Ill.; Winchester, Tenn.; Chicago, O.; Hampton, N. H.; Mena, Ark.; Charlotte, N. Y.; Sandersville, Ga.; Palatka, Fla.; Hawkinsville, Ala.; Dayton, Tenn.; Schoharie, N. Y.; Germantown, O.; Milledgeville, Ill.

Mobile, Ala.—The special committee appointed by the city council to put into shape the project for municipal ownership of the water works and sewerage systems decided recently to unanimously recommend the issuance of $750,000 of 4 per cent. fifty-year bonds, secured by a mortgage on the proposed water works and sewerage plants.

The question of issuing bonds for the construction of water works will be voted on as follows: Parnassus, Pa., Feb. 15; Elma, Ia., March 28; Winchester, Ind., Feb. 8; Vailsburg, N. J., Feb. 23; Berkeley, Cal.; Fayette City, Pa.; Clarington, O.; Hillertown, Pa., Feb. 15; Santa Ana, Cal., Feb. 5; Boyertown, Pa., Feb. 15; Prattsburg, N. Y., March.

CONTRACTS AWARDED.

Oakland City, Ind.—The contract for building water works has been awarded to L. M. Shoemaker & Co., of Bloomington, Ind.

Macon, Ga.—The contract for building the new pumping station for the Macon Gas Light and Water company has been awarded to J. N. Hazlehurst.

New Britain, Conn.—The contract for furnishing 10,000 ft. of 6-in. pipe has been awarded to M. J. Drummond & Co., New York City, at $19.78 per gross ton.

Williamstown, W. Va.—A franchise has been granted F. R. Porter, Chas. Dowling and A. Richter of Marietta, O., for erecting a compressed water works system in this town.

Johnstown, Pa.—The contract for furnishing 36-in. pipe for a four-mile extension to the Stony creek supply has been awarded to the National Foundry and Pipe Works of Scottdale, Pa.

Cincinnati, O.—The Lane & Bodley Co., of this city, secured the contract for furnishing

three 30,000,000 gal. pumping engines for the water supply for $387,000. This bid includes the necessary boiler plant and an offer to build a fourth pump for $119,000.

CONTRACTS TO BE LET.

Elk Point, S. D.—Bids will be received until Feb. 5 for constructing a water works system. H. D. Moore, cy. clk.

Gallatin, Mo.—Sealed proposals will be received until Feb. 10 for the construction of a water plant. I. Mann, Mayor.

Elmwood Place, O.—Sealed proposals will be received until Feb. 2 for constructing a water works system. Harry G. Schaefer, vil. clk.

Cleveland, O.—Bids are asked until Feb. 2 for furnishing and delivering cast iron water pipe and special castings required during 1898. Geo. R. Warden, dir. P. W.

Jersey City, N. J.—Bids will be received until Feb. 23 for a new permanent water supply, by gravity, pumping or filtration. Geo. I. Bouton, clk. St. and Water Bd.

Albany, N. Y.—Bids are invited until Feb. 15 for constructing water filtration plant, contract No. 3, consisting of eight covered masonry filters, sedimentation beds and certain appurtenances. Geo. I. Bailey, supt. W. W.

BRIDGES.

Ft. Wayne, Ind.—Plans have been completed for a bridge across St. Mary's river to Elm-st. Cy. Engr. Randall.

York, Neb.—Bids are asked until Feb. 16 for all bridges to be constructed in York county during 1898. J. D. White, co. clk.

Litchfield, Ky.—The construction of three steel bridges is contemplated in this county in the spring. J. B. Rodgers.

North Tonawanda, N. Y.—A petition is being circulated asking for a low bridge across the Niagara river to Grand Island.

Grand Rapids, Mich.—The question of building a $10,000 bridge across the river at Plainfield will be voted on in April.

Clinton, Ind.—The question of appropriating $12,000 for constructing a bridge over Wabash river will be voted on Feb. 3.

Pittsford, N. Y.—A bill has been introduced in the senate appropriating $19,000 for a bridge over the Erie canal at Main-st.

Bucyrus, O.—The commissioners contemplated the construction of a new steel bridge over the Sandusky river at N. Main-st.

Indianapolis, Ind.—The county commissioners are being urged to build a new bridge across White river at Raymond-st.

Madison, S. D.—The county commissioners are considering the construction of a bridge on the line between sections 16 and 17.

Washington, D. C.—Bids will be received by the district commissioners until Feb. 3, for widening the P-st. bridge over Rock creek.

Beauford, Minn.—Sealed bids will be received until Feb. 2 for constructing a steel bridge over Big Cobb river. Chas. Graf, chrmn. co. bd.

Brookings, S. D.—Bids will be received until Feb. 15 for constructing a 60-ft. span wood or combination bridge across the Sioux river in Medary twp. J. T. Nelson, Co. audt.

New Haven, Conn.—Two plans were submitted, Jan. 19, by City Engineer Kelly, for the proposed new bridge over West river at Derby-ave.

Leavenworth, Kas.—Sealed proposals will be received until Feb. 7 for building two iron bridges over Tonganoxie creek. J. W. Niehaus, co. clk.

Madison, Minn.—The town of Maxwell has asked the county board to aid in constructing a bridge across the east branch of the Lac Qui Parle river.

Bridgeport, Conn.—An appropriation of $25,000 for building a new bridge over Yellow Mill pond, will be requested by the harbor committee of the common council.

Wapello, Ia.—The board of county supervisors has ordered the construction of a wagon bridge across the Iowa river, at a cost not to exceed $15,000.

Baltimore, Md.—A petition has been presented to the commissioners asking for a bridge over the Petapsco river, on the road leading from Deer Park road to Oakland Mills.

Dayton, O.—(Special.)—E. Brentlinger says bids will be received Feb. 26 for constructing a bridge over the bayou at the Rip Raps in Wayne twp. Co. audt.

Cincinnati, O.—Sealed proposals will be received until Feb. 5 for constructing two wrought iron or steel Pratt truss bridges across Eight Mile creek, on Eight Mile road.

Milwaukee, Wis.—Plans and specifications for the proposed new Grand-ave. bridge are on exhibition at the office of the board of public works; estimated cost between $55,000 and $65,000.

Peoria, Ill.—Bids are asked until Feb. 2 for constructing two bridges at Laura Bradley Park, one to be an iron bridge and one to be a masonry arch. B. F. Cartwright, secy. bd. park trustees.

Saginaw, Mich.—Plans have been prepared by Engineer Terry for the Court-st. bridge, which will be considered by a special committee consisting of Aldermen Roslyn, Fordney Higgins, McLean and Bird.

Hartford, Conn.—The contract for constructing the new masonry bridge across the Park river, on Park-ave., has been awarded to H. J. Mullen of Ozone Park, N. Y., for $24,480. The bridge will have an asphalt roadway.

Lowell, Mass.—(Special.)—Geo. Bowers, city engineer, says the contract for constructing a plate girder bridge, 105 ft. long and 50 ft. wide, including 27½ ft. sidewalks, was awarded, Dec. 28, to Frank R. Long of New York City for $5,612.

Muskegon, Mich.—A resolution was adopted by the board of supervisors, Jan. 14, to submit to vote in April a proposition to bond the county for $25,000 for the purpose of building a new road and two iron bridges between Muskegon and North Muskegon.

Allegheny, Pa.—Chas. Davis, co. engr., recommends an estimate of $89,100 for 1898, to be expended as follows: For rebuilding six bridges, $29,600; erecting 15 new bridges, $49,800; repairs and maintenance, $7,400; other expenses, $2,300. The new bridges recommended are: Over Abers creek, in Patton township; Poketo creek, Plum; Days run, East Deer; Bodies run, Plum; Crawfords run, East Deer; Smiths run, Forward; Gourdhead run, Hampton; Reardons run, Findlay; Lick run, Jefferson; Piney Fork, Bethel; Painters run, Upper St. Clair; Chartiers creek, Scott and Collier.

GARBAGE DISPOSAL, STREET CLEANING AND SPRINKLING.

South Bend, Ind.—The construction of a garbage disposal plant is under consideration.

East Orange, N. J.—The question of constructing a garbage crematory is being discussed.

Dayton, O.—The comptroller has been directed to ask for bids for removing the garbage, ashes, etc.

Lafayette, Ind.—Bids are asked until Feb. 14 for constructing a garbage crematory, etc. Thos. W. Burt, cy. clk.

Newark, N. J.—The construction of a garbage disposal plant is recommended by Health Officer Chandler.

Johannesburg, Transvaal, So. Af.—Press reports state that the town committee has decided to build a garbage crematory.

Covington, Ky.—An ordinance providing for cleaning the asphalt streets was referred Jan. 17 to the internal improvements committee.

Minneapolis, Minn.—The council committee on sprinkling is inquiring into the methods of electric street sprinklers for streets.

Elizabeth, N. J.—The contract for removing the garbage, etc., for three years was awarded, Jan. 3, to Theodore Glaser for $18,000.

Springfield, Mass.—The purchase of new sweepers is recommended by the superintendent in his annual report.

Lima, O.—The board of health is securing prices for two garbage collection wagons. Bids will be asked for collecting the garbage.

San Diego, Cal.—The San Diego Garbage Crematory company, recently incorporated, is said to have submitted a proposition to council.

Utica, N. Y.—A bill will be introduced to reduce the paving fund to $35,000 by diverting $15,000 for the purpose of cleaning streets.

Omaha, Neb.—Bids are asked until Feb. 2 for furnishing the city with one to eight street sweeping machines. Wm. Coburn, secy. Advisory Bd.

Jersey City, N. J.—The contract for cleaning, sprinkling and maintaining the southern end of the Western Boulevard has been awarded to John Nolan.

Cambridge, Mass.—The question of appropriating money for the purchase of a garbage crematory is said to be under consideration by the finance committee.

Toledo, O.—Bids will be asked, according to press reports, for collecting and disposing of the garbage by the reduction or crematory process. Councilmen Englehart, Reeves and Meissner.

Birmingham, Ala.—The lowest bid submitted Jan. 10 for removing garbage from the city for the period from Feb. 1, 1898, to June 31, 1899, was that of Dunn & Lallande Bros. at $579 a month.

Rochester, N. Y.—Press reports state that on account of the failure of the Wayneport Garbage Reduction plant of the Flower City Reduction company Hascal A. Hogel, a member of the company, and the receiver, are preparing to build a new plant.

St. Louis, Mo.—It is probable that bids will now be asked for a 3-year garbage collection contract. The present contract with Col. Edward Butler expires in June, while that with the owners of the reduction works will expire in three years. Health Comr. Starkloff.

Hartford, Conn.—The street board is considering the purchase of a Furnas pneumatic street cleaning machine, manufactured by the Indianapolis Street Cleaning company of Indianapolis, Ind. The company reported that it would build a machine and ship it on approval, the board to pay all expenses if the machine is not accepted.

Washington, D. C.—At the 98th regular meeting of the Chemical Society of Washington Mr. E. E. Elwell, an assistant chemist of the department of agriculture, spoke on "Garbage Disposal." All the cities in the United States of over 10,000 inhabitants, he calculated, produced annually 1,500,000 tons of garbage, in which were contained grease and tankage to the value of about $4,000,000. After dwelling on the profit to be obtained from working the potash, phosphoric acid and nitrogen from garbage of this value, Mr. Ewell described the plants at Philadelphia, New York, St. Louis, Milwaukee, Detroit, Buffalo, Denver, Pittsburg and Providence.

PARKS.

Louisville, Ky.—The park board will be requested to make a public park of Lion Garden.

Des Moines, Ia.—The park commissioners contemplated establishing a park on the island below the bath house.

Indianapolis, Ind.—Surveys are being made by Park Engineer Power of the boundaries of the newly adopted park system.

Anderson, Ind.—An effort will be made to arouse interest in a project for converting the Indian mounds, which lie east of this city, into a state park.

Atlanta, Ga.—Plans are being considered for establishing a park on the north side of the city. Paul D. Romare, president First National Bank, interested.

Brooklyn, N. Y.—The new East river bridge commission has made a proposition to turn all the land between S. Fifth and S. Sixth-sts., from Kent-ave. to Bedford, alongside of and under the bridge, into a public park and place it in control of the park department.

Trenton, N. J.—The legislative committee of the board of freeholders and County Counsel Munn of Essex set Jan. 28 as the time for them to go over the system of parks now under way in Essex county, and explain the urgency for the appropriation asked for in the Ketcham park appropriation bill.

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